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ORIGINAL COMMUNICATIONS.

ART. I. *On the Physiological Effects of the* Aconitum ferox. By Jonathan Pereira, F.L.S. Member of the Royal College of Surgeons in London, and Lecturer on the Materia Medica and Chemistry.

Having been requested by Dr. Wallich to determine what are the physiological effects of the root of the *Aconitum ferox* on the system, I undertook a series of experiments for this purpose, the results of which are given in the second part of Dr. Wallich's splendid work, "*Plantæ Asiaticæ rariores.*" The objects of the following paper are, to give an account of the experiments themselves, and of the inferences which may be drawn from them.

Dr. F. Hamilton, in his "*Account of the Kingdom of Nepal,*" p. 98, mentions that large quantities of the root termed by the Nepaulese *Bish* or *Bikh*, and *Hadaya Bish* or *Bikh*, are annually imported; and that this root is a most virulent poison, whether taken into the stomach or applied to wounds. He adds that it "is in universal use for poisoning arrows; and there is too much reason to suspect for the worst of purposes. Its importation would indeed seem to require the attention of the magistrates. The Gorkhalese pretend that it is one of their principal securities against invasion from the low countries; and that they would so infect all the waters on the route by which an enemy was advancing, as to occasion his certain destruction. In case of such an attempt, the invaders ought no doubt to be on their guard; but the country abounds so in springs that might be soon cleared, as to render such a means of defence totally ineffectual, were the enemy aware of the circumstance."

In commenting on Dr Hamilton's account of this poison, Dr. Wallich says, "His statement of the belief of the Goorkas, that the Bikh would protect them from foreign invasion, and his opinion that such a kind of defence might be easily frustrated, have been fully verified during the late war with Nipal. In the Turraye, or low forest-lands, which skirt the approach to that country, and among the lower range of hills, especially at a place called Hetounra, quantities of the bruised root were thrown into wells and reservoirs, for the purpose of poisoning our men and cattle; the attempt, however, was very soon discovered, and effective precautions taken to prevent the occurence of any serious mischief."

Dr. Wallich was informed by Henry Colebrooke, Esq. "that the Bikh is employed in the northern parts of Hindustan for destroying tigers. Arrows poisoned with that drug are shot from bows fixed near the tracts leading to their watering places; and it generally happens that the animal is found dead at the latter."

Dr. Hamilton believed that the Bikh was a species of *Caltha*, but Dr. Wallich (*Wall. apud Seringe Mus. Helvet.* I. p. 160. t. 15. f. 43, 44. *Decand. Prodr.* I. 64.) has shown that it is a species of *Aconitum*, to which on account of its virulent properties he has given the specific name of *ferox*. The following are its characters:— "*A. ferox:* floribus racemoso-paniculatis, villosis; galeâ semicirculari, anticè acutè porrectâ, deorsùm attenuatâ; cucullorum sacco longo, angusto, calcare inclinato, labio elongato, recurvo; filamentis alatis, subsagittatis, ciliatis, ovariis, capsulis ramisque villosis; foliis quinquèpartito-palmatis, subtùs pubescentibus, lobis inciso-pinnatifidis, basi cuneatis, lobulis acutis, divaricatis."

The specimens of the root of the *Aconitum ferox* which Dr. Wallich sent me, had been in his possession ten years. We may therefore very fairly conclude that they had lost part of their poisonous properties, although, as will presently be seen, they still were very active. One portion of the root was powdered, a second portion digested in boiling rectified spirit, and a third in boiling distilled water. The infusions were separately evaporated to the consistence of soft extracts.

During the time that the spirituous infusion was evaporating, I several times tasted it, and did not at first notice in it any thing peculiar. At the expiration of ten minutes, or a quarter of an hour, however, a peculiar biting and numbness came on in the tip of the tongue and in the lips. Shortly after the soft palate became affected; a sensation being felt, as if the velum and uvula were elongated, and rested on the dorsum of the tongue; to relieve this frequent attempts were made to swallow. So powerful and unpleasant was this sensation in the soft palate, that I became rather alarmed at it; at the end of about a quarter of an hour, however, it entirely left me. The numbness of the lips and tongue continued for eighteen hours.

Dr. Boott experienced the same affection of the throat, and of

the tongue and lips, from tasting a small portion of the alcoholic extract. Dr. Wallich, who took a still smaller portion, experienced only the numbness of the tongue and lips. This sensation was also felt by Dr. Falconer and Messrs J. & G. Greeves. It is deserving of notice that Mr. Brodie experienced a remarkable sense of numbness of the lips and gums, which did not subside for two or three hours, from chewing a small quantity of the leaf of the *Aconitum napellus*. My assistant, Mr. Lunn, experienced a peculiar tingling sensation in the nose, from powdering a small portion of the root of the *A. ferox*. This sensation produced occasional sneezing, and lasted for four hours.

All the experiments which I am now about to relate, were made in the presence of Dr. Falconer, Assistant-Surgeon on the Bengal Establishment, (to whom I am much indebted for acting as secretary on the occasions,) and my brother Mr. Jer. Pereira; and most of them in the presence also of Messrs. G. & J. Greeves.

Exp. 1. *Feb.* 14. 1830.—Five grains of the powdered root were attempted to be introduced into the throat of a small rabbit, by means of a glass tube. In consequence of the struggles of the animal, part (estimated at two grains) was wasted in the attempt. In one minute there was difficulty of breathing; the animal appeared to be in pain; and two or three drops of fluid, mixed with a little of the powder, dropped from the mouth. In three minutes the difficulty of breathing was much increased, and to which was added a flow of saliva from the mouth. In twelve minutes, the posterior extremities were much weakened, if not paralyzed: the animal remained in whatever position he was placed in. At the end of seventeen minutes, he could not support himself in the erect posture. In eighteen minutes, convulsions of the throat and of the posterior extremities; and a little urine passed. The limbs became relaxed, and the animal was apparently dead at the end of nineteen minutes. At twenty minutes, the contents of the intestines were evacuated.

Galvanism.—At thirty minutes after death the voluntary muscles were found to be susceptible of the galvanic influence; and the vermicular motion of the intestines was much increased by it. Slight contraction was produced once only in the muscular fibres of the heart: other attempts to produce this effect failed.

Dissection.—The left side of the heart was found empty: the right filled with blood. Lungs florid red. Pulmonary arteries distended. Part of the powder was found in the trachea. The stomach was filled with food.

Remarks.—As part of the powder had got into the trachea, no very accurate inferences could be drawn as to the peculiar operation of this poison. Subsequent experiments, however, proved that the general symptons were in all the cases similar.

Exp. 2.—One grain of the alcoholic extract was introduced into the peritoneal sac of a small rabbit. In two minutes the posterior extremities were weakened: in three minutes, the breathing became difficult, and of a peculiar gasping kind: in three minutes and a half, the head was drawn back: in five minutes the animal was slightly convulsed, and fell on his side: in six minutes convulsed, and made ineffectual attempts to rise: the breathing was very laborious. At the end of eight minutes the posterior extremities, when pricked, gave no evidence of possessing sensation: In nine minutes general convulsions came on, and at nine minutes and a half the animal was apparently dead. At this time the pupils were much dilated, but in three minutes after began to contract.

Galvanism.—Six minutes after death the voluntary muscles were susceptible of galvanism; but this susceptibility soon ceased. Contractions were excited in both auricles of his heart, and the right auricle repeated its contractions after the poles of the battery were removed. The effect of galvanism on the muscular fibres of the ventricles was doubtful. I thought that I perceived slight contractions, but they were not noticed by others.

Dissection.—Right side of the heart distended with dark-coloured blood; left side empty. Lungs florid red. Pulmonary arteries distended.

Remarks.—The first and prominent symptoms here, were the weakness of the posterior extremities and the difficulty of breathing. On feeling the chest, it appeared to me as if spasm of the diaphragm came on at each inspiration. The drawing back of the head did not appear to be altogether involuntary, but as if it were to fix the head, and thereby assist the breathing. The convulsions in this and the other experiments, were very different to those produced by strychnine: in the former cases they were quite temporary, whereas those produced by strychnine last for several seconds.

Exp. 3.—One grain of the spirituous extract (a little drier than in the last experiment) was introduced into the subcutaneous cellular tissue of the left lumbar region of a rabbit. Immediately after the experiment, the animal continued to eat, but at the end of six minutes refused to do so. At seven minutes the fæces were evacuated: at eight minutes grinding of the teeth; head drawn back; a little saliva flowed from the mouth. In nine minutes the movements of the animal became unsteady; and at nine minutes and a half he became unable to support himself; convulsions. In ten minutes the posterior extremities were insensible: in eleven minutes the convulsions became much more active, particularly in the posterior extremities; repeated faint cries. At thirteen minutes the animal was lying on its left side, and was free from convulsions. At fourteen minutes violent action in the abdominal muscles: fourteen minutes and a half, convulsions in the posterior extremities: urine passed: pupils much dilated. At the expiration of fifteen

minutes the animal was apparently dead: shortly after which the pupils began to contract.

Galvanism and Dissection.—The phenomena were the same as in the last experiment.

Remarks.—As I had anticipated, the poison took longer time to produce death, when introduced into the subcutaneous cellular tissue, than when introduced into the sac of the peritoneum. I may remark that the repeated faint cries mentioned here, appeared to all who witnessed the experiment, to be, in part at least, the result of the involuntary action of the respiratory muscles.

Exp. 4.—Two grains of the *watery* extract were introduced into the peritoneal cavity of a full grown rabbit: part of the extract was diffused over the wound, in consequence of the exudation of some fluid from the abdominal cavity. In two minutes the animal appeared to be slightly affected: seemed uneasy, and licked the wound. In five minutes stretched out his hind legs: respiration hurried. At the end of nine minutes the urine was passed; and at ten minutes one or two efforts were made to swallow. In fifteen minutes staggered. At seventeen minutes and a half, the head was drawn temporarily to one side. At twenty minutes appeared much enfeebled: frequent convulsive gasps: unable to support itself: laid stretched out: fore legs principally affected: respiration irregular. At twenty-five minutes was unable to rise: strong convulsions: faint cries: pupils much dilated: eyes much protruded. At twenty-seven minutes the animal was apparently dead. Immediately afterwards the pupils began to contract. Galvanism was not tried.

Dissection.—The appearances were the same as in former experiments.

Remarks.—This experiment demonstrates that the *watery* is less powerful than the *spirituous* extract. It must, however, be recollected that the animal in this case was stronger than those operated on in the former experiments, and that part of the poison was diffused over the wound. We must not hastily conclude, from this experiment, that the active principle of the root is more soluble in spirit than in water. The greater activity of the spirituous over the watery extract, may arise from water dissolving some proximate principles, (such as gum,) which are not soluble in spirit; for the quantity of spirituous extract obtained was very small as compared with that of watery extract obtained from the same weight of the root. In this experiment the fore legs were first affected, whereas in the former experiment the hind legs appeared first and principally affected.

Exp. 5. *Feb.* 16.—One grain of the alcoholic extract, placed on a small piece of cabbage leaf, was introduced into the back part of the mouth of a small rabbit, care being taken that he swallowed

the whole of it. The animal had been kept twenty-four hours without food, except that just before the experiment it eat a small piece of cabbage leaf very voraciously. After the extract had been put into his mouth, he made no attempt to eat a piece of cabbage leaf which was placed before him, although he approached it as if for the purpose of doing so. The only effect that we observed to be produced by the poison, was continued chewing as if the animal was ruminating, and which lasted for about an hour.

Remarks.—Although I anticipated that a comparatively slight effect only would be produced when the poison was introduced into the stomach, yet I was surprized to find no remote effect whatever (at least as far as we could judge) produced.

Exp. 6.—Two grains and a half of the spirituous extract, softened by two or three drops of rectified spirit, were placed in a small brass stop-cock tube, inserted into the jugular vein of a strong and good-sized dog. To this tube was afterwards attached a small syringe containing tepid water, so that by pressing on the piston rod, the water would be expelled, and passing into the tube, would drive the extract before it into the vein. The greatest precautions were taken to prevent the introduction of air. That part of the tube below the stop-cock, and which was within the vein, had been filled with water previous to its introduction into the vessel. That part of the tube above the stop-cock was filled by the softened extract, and the nozzle of the syringe. All the persons present were satisfied that no air was introduced into the vein. All the fluid (including the softened extract of the tepid water) thrown into the vein, did not exceed two drachms. Immediately after the injection the animal began to struggle violently. In one minute violent convulsions came on; the respiration became difficult; and the contents of the bladder and rectum were evacuated. In three minutes the animal was dead.

Dissection immediately after Death.—The jugular vein was dissected down to its junction with the subclavian. On puncturing it, a whitish-looking fluid mixed with blood escaped, followed by a clot of blood. The right side of the heart was distended with blood: the left quite empty. The inferior and superior venæ cavæ, and the pulmonary artery, were also distended. The blood was partially coagulated. The muscles of the chest quivered under the dissecting knife. The lungs were of a florid red colour.

Remarks.—The whitish-looking fluid found in the lower part of the jugular vein, was evidently formed by the mixture of the spirituous extract with the water of the syringe and the blood. That the symptoms and death of the animal arose from the peculiar action of the poison, I think can hardly be doubted. Yet there are three circumstances which may be brought forward against this inference. 1. The possible introduction of air; 2. The small quantity of spirit mixed with the extract; 3. The water thrown into

the vein. As I have before said, the greatest care was taken to guard against the introduction of air, and I, as well as every one who witnessed the experiment, were perfectly satisfied that none was introduced. As to the spirit and water introduced into the vein, although the death of a strong dog could hardly be attributed to the small quantity of these liquids, yet I resolved to try what the effect would be of throwing a mixture of these liquids into the vein. The experiment was performed, and will be detailed presently. I need only state here, that it proves most satisfactorily that the inference above drawn was correct.

Exp. 7.—One grain of the spirituous extract was introduced into the peritoneal cavity of a small rabbit, which had been kept twenty hours without food. At the end of one and a half minute, the animal licked the wound and laid down. In two and a half minutes the breathing became difficult; slight stupor: the head was held erect. In three minutes the head became quite bent back on the spine; convulsions. At four and a half minutes the hind legs were partially paralyzed. At five minutes the animal uttered plaintive cries; moved about with difficulty, drawing the hind legs after him in a kind of spasmodic manner: breathing slow and gasping. In seven minutes fell on his side: in nine minutes quite vertiginous: in ten and a half minutes tetanically convulsed. At the end of eleven minutes the animal was dead.

Remarks.—This experiment was made with the view of confirming Exp. 2. It will be observed that the symptoms were precisely similar. The only difference between the two experiments is, that in Exp. 2. the animal became affected half a minute sooner; and died one and a half minute earlier.

Exp. 8. *February* 19.—Present Dr. Falconer, and my brother Mr. Jer. Pereira.

Three grains of the spirituous extract, enveloped in a little cabbage leaf, were placed in the throat of a small rabbit, so that the animal was obliged to swallow it. The only effect observed was the continual chewing, as noticed in Exp. 5. At the end of four hours the animal was killed, but as the stomach was found distended with food, no inferences could be drawn as to the local action of the poison.

Remarks.—The experiment was made with a view of observing whether the poison exerted any local irritating action; but unfortunately no inferences can be drawn from it, for the reason above mentioned. It is to be recollected that rabbits do not vomit, and therefore the absence of this symptom proves nothing. If it be true, as Messrs. Morgan and Addison assert, that all poisons operate by producing sympathetic impressions, it is quite clear from the experiments now related, as well as numerous others on record, that the stomach is *not* an organ the most susceptible of sympathe-

tic impressions. That many of the most active poisons produce slighter effects when applied to the stomach than when applied to other parts, is well known The only possible ways that I am acquainted with of explaining this phenomenon are: 1*st*, By supposing that the stomach is less susceptible of sympathetic impressions than most other parts; 2*dly*, By supposing that the poison operates by absorption, and that the venous absorption of the stomach is less than that of other parts; 3*dly*, It is possible that the poison may be digested and converted into chyme.

Exp. 9. *March* 14.—Six grains of the spirituous extract were introduced into the stomach of a full grown strong dog, that had been kept fasting for twenty-four hours. The only effect noticed, and even that was doubtful, was strong shivering amounting almost to convulsions. This only took place once.

Exp. 10. *March* 21.—Present Mr. Jer. Pereira, Mr. Lunn, and Mr. J. Greeves.

This experiment was made to confirm Exp. 6. About three drachms of fluid, consisting of water with a little spirit, were thrown into the jugular vein, but no obvious effects were produced. To render it still more satisfactory, double the quantity of fluid was thrown in at the end of half an hour. No effects observable.

From the experiments now related, it appears to me that the following inferences may be drawn:—

1*st*, That the root of the *Aconitum ferox* is a most virulent poison.

2*dly*, That both the spirituous and watery extracts are poisonous, the former much worse so than the latter.

3*dly*, That the poison exerts a local action on the nerves of the part to which it is applied.

4*thly*, That its remote action is on the nervous system.

5*thly*, That the intensity of this remote action is in proportion to the absorbing powers of the part to which it is applied.

6*thly*, That the immediate cause of death is asphyxia.

7*thly*, That this poison diminishes the irritability of the heart.

8*thly*, The symptoms produced by it were, difficulty of breathing, convulsions, and paralysis of the extremities.

9*thly*, As far as my experiments have been carried, there appears to be a great analogy between the effects of this species of *Aconitum* and the *A. napellus*. Dr. Wallich informs me that the *A. ferox* is used in India as a therapeutic agent in rheumatic cases. Now the *A. napellus* has been used in these cases in Europe,—a circumstance which tends to confirm the supposition, that the effects of these two species of *Aconitum* are similar.

Aldersgate Street, London, May 1830.

ART. II.—*Notes on* Aspidium aculeatum, *and its Allies.* By G. A. Walker Arnott, F.L.S. F.R.S.E. &c.—(*In a Letter to the Editors.*)

Gentlemen,

Favour me with the insertion of the following remarks in your Journal, respecting this tribe of ferns:

1. *A. aculeatum,* Sm. is the plant of Linnæus, and I think also of Swartz. *A. aculeatum,* Willd. is intended to contain both *A. aculeatum* and *lobatum* of Smith, but principally refers to the latter. Dr. Hooker's *A. aculeatum* is entirely *A. lobatum,* Sm. but the observation, "I have seen some plants which might almost be considered to unite the two," given under his *A. lobatum,* (British Flora, p. 443.) applies I believe to the *A. aculeatum* of Smith.

2. *A. lobatum,* Sw. seems that of Smith, but *A. lobatum,* Willd. and Hook. (I allude to the British Flora,) is *A. angulare,* Smith.

3. *A. angulare,* Sm. and Hook. is not *A. angulare,* Willd. I rather suspect it to be *A. orbiculatum,* Desv.

4. *A. Plukenetii,* Loisl. and De C. is a variety of *A. lobatum,* Sm. with the frond pinnate, the pinnæ being deeply pinnatifid, which has given rise to the query in De Candolle and Duby's "Botanicon gallicum," if all these and *A. lonchitis* be not states of one and the same species?

The above may have their synonymes thus arranged:—

1. *A. lobatum,* Sw. and Sm. Eng. Bot. t. 1563. (not Willd. nor Hook.) *A. aculeatum,* Hook. (exclus. syn. Sw. and E. Bot.) and Willd. (exclus. of many synonymes,) almost entirely, and also of most foreign botanists;—*A. Plukenetii,* Loisl.

2. *A. aculeatum,* Lin. Sw. and Sm. Eng. Bot. t. 1562. and Willd. (scarcely at all;) *A. lobatum, intermediate variety,* Hook.

3. *A. orbiculatum,* Desv.; *A. angulare,* Sm. Eng. Flora, and Hook. Brit. Flora, but not of Willdenow; *A. lobatum,* Willd. and Hook. (exclus. all syns.)

But are these species? I fear not. The chief character between *A. lobatum* and *A. aculeatum,* is the decurrent pinnules of the former, and the distinctly petiolate pinnules of the latter; but I have seen specimens very much between the two: and these also have neither the compact frond of the one, nor the loose frond of the other. Again, as to *A. aculeatum,* and what I call *A. orbiculatum,* there is also an intermediate state, in which the serratures are deeper and more pointed, and the pinnules more acute than in *A. orbiculatum,* but not so much so as in *A. aculeatum.* The *A. appendiculatum* of Gay, (I am not sure if it be published under this name,) which that botanist gave me from Veviers in France, and with which he hesitatingly suspected "*A. aculeatum,* Sm. but certainly not of Sw. or Willd." to be the same, appears to me to be also intermediate, partaking of the short pinnules of the one, but the acute pinnules of the other. This state has been gathered by Dr. Johnston at the Pease-bridge in Berwickshire.

ART. III. *Notes on the University of Christiania.* By James F. W. Johnston, A.M.

The city of Christiania has been too much praised. In itself it has nothing to repay the traveller for the fatigue of an hour's stroll through its streets. I do not remember a single building,—the castle excepted; for all castles derive from association a kind of interest which does not attach to mere architectural magnificence,—except this one I do not recollect any building in Christiania which would be worth visiting in any other city. But all cities are judged of by the country in which they are situated, and by the circumstances under which they are seen. The houses are all of stone, and this is grandeur enough in Norway. My first impressions of Christiania were produced and confirmed during a period of incessant rain, and when fine weather came I could see nothing to admire in its dull streets. But these remarks include all my objections to the capital of Norway. Its situation is beautiful and picturesque beyond description. Copenhagen is a finer by far and more cheerful-looking city, and it stands in a rich country, but it is a flat, and tame, and interminable country. Stockholm is a more majestic city, and its situation is abundantly romantic; and the view from the lofty spire of St. Catherine's church, stretching over the city and the lake Maeler, with its twenty thousand isles, amply repays the labour of climbing to its summit; but the city is heavy, and, hemmed in by everlasting woods of pine, has a gloom about it, which the bright sun of summer does not wholly expel. Christiania is a plain town, with straight streets crossing at right angles, but unadorned and without pretension; yet I have seen few finer sights than this city presents, viewed either from the lofty hill by which the traveller from the east and south approaches it, or from the summit of the Ergeberg, on the opposite side of the lake, when the sunbeams are gilding the mountain sides, or playing among the leaves of the trees that stretch far up the valley, or rest on the white chimnies of the city, fringing the lake beneath our feet. In fine weather, a month could be delightfully spent in the neighbourhood of this capital; for the Fiord, with its numerous arms and inlets,—the rich low grounds that not unfrequently skirt them,—and its many bold and wooded promontories;—and on land, the fertile and richly cultivated valleys, with sweet villas and villages, lying scattered at different distances from the city, hemmed in all of them by lofty mountains, which seem to thrust up their dark pine woods into the clouds, render boating or walking on a cool summer evening as pleasant in Christiania, as it can be in any other part of the world.

The Royal Norwegian University of Christiania, was founded by the present king of Denmark, Frederick VI. so late as the year 1812, and the royal ordinance by which its present constitution

was established, is dated at Gottenburg 28th July 1824. Previous to 1812, students from Norway were all educated at the University of Copenhagen. The professors are eighteen in number, of whom two belong to the faculty of theology, one to that of law, four to the faculty of medicine, and eleven to that of philosophy. This last number includes the professors of chemistry, natural history, and mineralogy. There are besides one lecturer on medicine, and on philology four lecturers and two assignati.

The University is yet in its infancy, and the funds for its support still in some measure unconsolidated. These funds are derived from tithes, from bequests, from lands, and other similar sources. The funds settled upon it being at present burdened with annuities, renders it necessary to obtain a yearly grant from the Storthing, the native parliament, which has hitherto been very liberal. The regulations of the University are nearly the same as those of the University of Copenhagen. Each professor delivers a public course of lectures gratis; for private lectures he may take a fee, but few of them find it worth their while. The only fixed sum payable by the student is five specie dollars, about 17s. Sterling, to the library, when he is first admitted to the University. There are two sessions annually, commencing in February and August, and the holidays are limited by statute to two months and a half in the year. The number of students enrolled in the session commencing in August last was about 550. The preliminary examination, *examen artium* as it is called, similar to the Blackstone examinations at Glasgow, is rather strictly gone about. Of 120 who presented themselves for matriculation at the above session, ten were rejected. Where no fee is obtained from the student, there is no inducement to pass any who are unqualified. These examinations are public, and were going on during my stay in Christiania, but I had already seen something of them in Copenhagen, and felt therefore little curiosity to witness a second exhibition. The alumni in Scandinavia are no whit more ready at their answers than we find them at home.

The University buildings in Christiania have nothing imposing in their exterior. They are shabby rather, though not much inferior to the University buildings in Copenhagen. They were not built indeed for the University, but must have been erected long before. The intention of King Frederick in 1812, was to have established the University not in the city, but in the suburbs of Christiania. For this purpose a beautiful spot called Toien was purchased, so situated as to command a view of the old town (Opslo) to the east, and of the new town (Christiania) to the west. But in 1813 a change took place in the currency, and the money which had been collected was too small to permit the plan to be carried into execution. The botanic garden and the museum only were erected on this spot, and other buildings in the city were sought out for class-rooms. The present, therefore, may be consi-

dered as a temporary locality, to be changed for a better when their funds become more flourishing.

My visit to Christiania was a sudden thought, and I came therefore unprovided with letters. It was only a week before, when I reached Wenersborg, on my way from Gottenburg to Stockholm, that I resolved on making a detour to the capital of Norway. I found in consequence, the wet weather, which prevailed for several days, more disagreeable than it might otherwise have been.

Of men of science there was but one I wished much to see—Professor Hansteen ;* and he was then absent on his well-known magnetical expedition. In regard to this gentleman the Norwegian Parliament have behaved with great liberality. They have advanced him in all, to enable him to perform his tour, about £3000 English—a large sum to be devoted to one object of general science by a country so circumscribed in its finances as Norway is.

Esmarck, to whom mineralogy owes the knowledge of several new species, was also absent on a tour in Denmark. I lost in consequence the pleasure of seeing his cabinet of minerals ; and, what I regreted as much, of obtaining his advice as to the most profitable mode of disposing of the short time I could devote to the mineral riches of this interesting country.

Keyser is professor of physics and chemistry ; but he is a man of no industry. He works none ; and instead of dedicating himself to the sciences, and joining his efforts to those of other men to remove the limits of knowledge one step further back, he employs himself in forming schemes for getting away from Christiania. He dislikes the place, and hence the place has ceased to be very fond of him. I wonder at his dislike to Christiania ; for his country house is one of the sweetest of the many sweet spots that lie within two or three miles of the city. He contrived, after the cession of Norway to Sweden, to get himself appointed one of the Commissioners for settling the amount of the Danish National Debt and other charges which should fall upon Norway, and in this office he spent three years at Copenhagen. People said that he staid longer than he needed to have done ; and from that probably arose part of the bad odour in which he still stands. The secret of a great many people's idleness is, that they *do not need to work ;* but one would think that the high name of Scandinavia in physics and chemistry, would incite most professors of those sciences in that country to try to do something ; yet it is a remarkable fact, that, high as Sweden stands as a cultivator of the science of chemistry, yet the professor of that science at Lund is a mere drone, and those at the University of Upsala are little better.†

* Professor of Applied Mathematics.

† I am in hopes that should this ever meet the eye of Walmsted, who was appointed to a chair some three years ago in Upsala, it will set him about employing his talents to some better purpose than in the mere arranging of mineral cabinets.

I made an attempt to see Keyser's laboratory,* and he also did me the honour of calling upon me. But we missed each other; and severe domestic affliction was an ample excuse for my having no subsequent opportunity of seeing him during my short stay. It is to the credit of the Norwegian Storthing, that they have provided a splendid philosophical apparatus for their national University. "It is so fine," said Berzelius to me, when I visited him in Stockholm, "that all the apparatus of the three Swedish schools put together would be nothing like it." On account of this apparatus, chiefly, I regretted not having made the acquaintance of Keyser—for every experimental philosopher knows how interesting it is to see the workshops and tools of his fellow labourers in different parts of the world.

What a fine field there is for a diligent analytical chemist in Norway!—and how would the patriotic Norwegians honour the man who, from the far north, should send forth the voice of discoveries that should do honour to their beloved land! The Norwegians are a brave people—a kind people—and an intelligent people—what hinders then that they should become also a learned and scientific people? Their minds must be alive to high thoughts; for their very mountains speak sublime things to them.

Rathké is professor of natural history,—a kind gentlemanly man, and who has seen a good deal of other countries. "It is my duty, as it is my pleasure, to pay attention to strangers," he said to me; and I accordingly found him willing to devote to me as much of his time as his other duties would permit.

The Museum,† which is under his care, is, like the university, still in its infancy, and is not therefore very extensive. The objects of curiosity are chiefly minerals and birds. The minerals are dirty, and in bad order; and many of the birds are very indifferently got up. Zoology has more attractions for Rathké than mineralogy; the superintendence of the mineralogical part of the museum should therefore be confided to Esmarck. What the museum wanted in interest, however, the Professor made up for by his desire to please and gratify; and I owe him this testimony for his gratuitous attentions. Professor Jameson is well known in Norway, and Rathké was anxious to acknowledge the honour done to him by his being elected a member of the Wernerian Society, of which Professor Jameson is president.

The Botanic Garden is also under the superintendence of Rath-

* That some little is done, or ought to be done, in the rudiments of practical chemistry, may be inferred from the "Catalogus Lectionum"—"Laboratorium Universitatis Chemicum tempore utrinque commodo iis patebit qui experimenta chemica agere cupiverint."

† So much has lately been said of muscums, and admittance to them, in this Journal, that I may insert the following two lines from the Catalogus Lectionum already quoted:—"Musæum Historiæ Naturalis et Hortus Botanicus Universitatis, horis commodis patebunt iis qui *voluerint* collectiones inspicere."

ké as professor of zoology and botany. Incessant rain is not favourable for the survey of such gardens, and therefore I did not see that of Christiania. It would seem, however, to be in a flourishing state; for, though commenced by Siebke so late as 1815, it already contained in 1823, when the last catalogue was published, 930 genera, comprising nearly 5000 species. Both the museum and the garden were kindly assisted with duplicates from the University of Copenhagen; and the seeds and plants transmitted by Horneman gave its first importance to the rising institution.

Botany is the favourite and prevailing study in Norway, though this depends chiefly on its forming an important branch of medical education. The extent in which the term *prevailing* is to be taken, will be understood when it is added, that a *good class* for natural history may amount to 20, and a good chemistry class to an equal number. Professor Esmarck, who teaches mineralogy, geology, and oryctognosy, has a good class when it is from 10 to 15. The medical faculty would appear to be the best educated in Norway, as a course of theology or jurisprudence may be completed in three, while a medical course occupies from five to seven years. This is, however, to obtain the title of doctor—a degree which is seldom taken in the other faculties.

Of the various examinations which are undergone by the students before receiving their degrees and leaving college, I may here mention, as unknown among us, the *Bergsexamen* (mining examination.) This examen is thus specified in the statute: "At the Bergsexamen, the candidate, partly by written and partly by spoken proof, shall give evidence of his proficiency in the pure mathematics, namely, geometry, stereometry, trigonometry, algebra, equations, spherical-trigonometry, the first principles of the infinitesimal calculus—in applied mathematics, with their most direct application to machinery—in physics and chemistry—in oryctognosy and geognosy—in metallurgy—in mining, and in the reducing of ores. The candidate shall also give proof of readiness in architectural and machinery drawing." This examination has been instituted for the purpose of sending forth men capable of directing mining operations on the most scientific as well as the best practical principles. It were vain to talk of such examinations at our universities, where many of the subjects are not taught. To things merely practical, the application of science to the arts, little attention is paid in our public institutions. And perhaps it is better that we leave practical men to learn these things where they are in daily operation; for then only can they be properly and completely taught.*

* "In dyeing, for instance," said a well known *polyartist* of this city to me one day, "I have known a man who went always by his book. He put in so many ounces of this and so many pounds of that, but *he cou'dna get things to do ava.* I recollect one day he made up a blue vat after this fashion, but it *wadna work.* He was sure he had put in the right weights, so he didna ken what to do wi't.

Norway is the land of minerals—an inexhaustible and hitherto not half-explored field of mineral productions—yet there is no other way of obtaining them but that of visiting the localities where they are found. There are no dealers in Christiania, and the absence of Professor Esmarck shut me out from the only chance I had of procuring a few rarities. The only mineral I contrived to pick up in Christiania was a specimen of the chromate of iron, from Ferasen, near Rooras, which the director of one of the mines was kind enough to give me. In this locality it has been long known, but, until lately, was mistaken for common iron ore. It occurs in large veins, and in quantity is represented to be inexhaustible. It is found occasionally crystallized; the massive has much resemblance to the well known American chromate.

The interesting nature of the geological formations around Christiania, have long ago been made known by Von Buch. Several circumstances prevented me from giving them any thing more than a general examination. Among these, continued rain, and an anxiety to reach Stockholm, were not the least. After waiting in vain for fine weather at Christiania for several days, I dedicated the little time I could remain in Norway to an excursion to the silver mines of Kongsberg—a few notes relative to this excursion will form the subject of a future article.

ART. IV. *Account of Péron's Peninsula, in Shark's Bay, Western Australia; with Remarks on its capabilities and fitness to receive a small Fishing Settlement: compiled from various sources.* By a Gentleman in the service of the Hon. East India Company. (*With a Map, in which the French names are preserved.*)*

Peron's Peninsula is that extraordinary tongue of land which juts out from the west coast of the continent of Australia, in an immense gulf called Shark's Bay, the term *Bay* being here highly improper.

Weel, it was the market day, and some o' the Galashiels men were in, so he gangs awa an' brings down twa o' them to look at his vat. The tane o' them pits his han' intil the blue, an' lifts up a wee drap in his loof, and looks through to the light as he let it run out again. 'See what *you* think o't, John,' he then says to the tither ane. John taks up a wee drap an' looks through't. 'I think it's owre eauld.'—'I think sae too, John; throw in anither shoolfu' o' lime.' And in half an hour it was as fine a working vat as ye eou'd see. 'That's what I ca' *rule-o'-thumb* men,' added the polyartist; 'far better tradesmen nor your *weight-an'-measure* folk."

* From the general interest of this communication, we have been induced to forego the prineiple we laid down in the outset, of not admitting any article amongst our "Original Papers," which was not authenticated by the author's name. But as this account of Péron's Peninsula merely professes to be a com-

This peninsula is included between 113° 24′ and 114° E. longitude, and 25° 30′ and 26° 15′ S. latitude. Its length from north-west to south-east is about fifty miles, and its general breadth varies between twelve and fifteen. The isthmus of Taillefer, by which it is joined to the continent, is about a mile and a quarter broad.

Captain Baudin's expedition appears to have been the first, after Dampier, that visited this place,* the desolate appearance of which has been pourtrayed by M. Péron, the amiable zoologist of that expedition, as extreme, and the climate, both as to the heat by day and the cold by night, as perfectly insupportable.

The expedition under Captain Freycinet was its next visitor,† and M. Arago, in his narrative of that voyage, thus describes its appearance: "The coast, from the moment we first saw it, exhibited nothing but a picture of desolation; no rivulet consoled the eye, no tree attracted it; no mountain gave variety to the landscape, no dwelling was seen to enliven it: every where reigned sterility and death. Its outline is uniform, without breaks, almost without difference, and always very low. In the evening the sun sets; no voice disturbs the silence of this melancholy solitude; a sharp cold benumbs the limbs. In the morning the sun re-appears: a consuming heat oppresses us; we seek repose and find nothing but fatigue. What a frightful abode!"‡ "Several of our people attempted different excursions on the Peninsula, without finding a single rivulet of fresh water. It is to be presumed, therefore, that the poor natives drink only salt water, and live wholly on fish and a kind of pulse resembling our French beans, that is met with here and there in the interior."

The number of natives seen on this peninsula by M. Péron did not exceed thirty. They were armed with assagays and clubs; and during the stay of the expedition, their general conduct evinced a disposition to hostility and treachery, and in fact on one occasion they actually succeeded in forcing one of the boats to quit

pilation, the sources of which are open to examination, and as it is judiciously drawn up, we comply with the author's request to withhold his name.

In our first volume, p. 446, will be found a similar analysis of the information which is scattered through different works, respecting the country on the banks of Swan River. Ed.

* The Geographe anchored in Dampier's Bay on the 2d July 1801. On the 3d a most violent gale of wind (it being the depth of winter there) obliged the ship to quit the roads and put out to sea; and during the nights of the 3d and 4th, they were in great danger of being east upon some of the numerous shoals and sand-banks near Cape Shoals. They were finally obliged to sail from thence to Timor on the 6th of July. The Naturaliste arrived in Dampier's Bay on the 16th of the same month and year, and remained there until the 4th September. The Geographe was again there from the 16th to the 26th of March 1803.

† The Uranie arrived in Dampier's Bay in August 1818, and remained there to the latter end of September.

‡ Vide "Narrative of a Voyage round the World," by J. Arago.

the place and return to the vessel, by rushing down to the shore with loud shouts. The bay was from that circumstance named *Attack Bay.*

M. Arago was however rather more successful in procuring a short intercourse with a party of fifteen of the natives, who divided themselves into three bands; one of them had a small dog. As usual, their conduct displayed extreme fear, suspicion, treachery, and a disposition to hostility. "They are of a middling stature; their skin is as black as ebony; their eyes are small and lively; they have a broad forehead, flat nose, large mouth, thick lips, and white teeth; their chest is tolerably broad; their extremities are slender; their motions quick and numerous; their weapons not very dangerous; their agility is surprising; their language noisy. Some of them are tatooed with red; and the woman we saw, had her forehead tatooed, and was, like the men, perfectly naked."

In one of M. Arago's excursions, he found ten or a dozen ruined huts on the north shore, near Point Shoals. These huts are formed of a few branches, crossing each other, covered with brushwood and clay; they are six feet high, four or five broad, and three and a half above the ground. The entrance is almost always on the side facing the wind that most commonly blows. The natives make their fires in the centre, and sometimes around the hut. On some high points of land they erect also a kind of observatory, formed of a few trunks of trees, on which they post themselves to observe the distant country.

The articles obtained from these Indians by the French, consisted of a club, a very dirty fan, (probably a leaf of the fan palm from the interior of the continent,) some cassowarys' feathers, two bladders painted red, filled with very fine down, and an assagay of hard wood, six feet long, but not very sharp. "After our barter, we pretended to follow them, in order to try their courage, when they disappeared with astonishing swiftness."

In another account of Freycinet's expedition,* the description of Peron's Peninsula presents rather more encouraging features, if we carefully select all the circumstances, and particularly if we consider some of the articles in the possession of the Indians, with reference to the question, "Whence were they procured?" If we collate such incidents as bear a favourable aspect, and unite all these together, it will appear to any person who has resided in a hot climate, that the whole account of this spot has been drawn up under the great disadvantages of a hurried stay, apprehensions of being surprized or attacked by the natives, a constitution not equal to encountering the heat of a nearly tropical sun, and lastly, a want of sufficient provisions.

* "Nautical and Geographical Account of the Voyage of the Uranie," by L. Freycinet.

It appears by the latter account, " that although the shores of this Peninsula are sterile, yet it was remarked that at short distances there were vallies where the *vegetation was magnificent;* and that the human species seemed to be pleased with these favoured spots, as there were a great number of natives' huts, one of which was very spacious."

" Point Guichenot is, in particular, as well as the shores in its vicinity, covered by a multitude of trees, of which the verdure and the dimensions announce a vigorous and active vegetation. Little interior salt lakes communicate with the sea in this place, (probably similar to our " Backwaters" in Malabar,) and render this spot truly enchanting." Birds of a great number of species, appear to delight so much in this solitude, that when the French arrived, the trees, the ponds, and even the points of land, were all covered with them; but the presence of men soon frightened them away, for on another visit none were to be seen. " In fact, extinct fires, natives' footsteps, certain proofs of the recent presence of dogs, and several other kinds of quadrupeds, informed them of the motives of their flight."

Capes Rose and Roland are similar in profile, each to the appearance of an angle of a bastion; and from the latter cape to Point Shoals the coast resembles a line of fortifications, the cliffs descending in a slope to the shore at an angle of 45 degrees. The upper surface is a calcareous rock, a mixture of grit stone and petrified shells. The rocks of the whole peninsula are of this calcareous and shelly sandstone, and may be available for the purposes of building. There is also clay for brick-making, and the myriads of sea-shells afford an inexhaustible supply for burning into capital lime.

" The breadth of the peninsula at the north-west end, from Point Shoals to Cape Lesueur, is twelve miles."

The north-west coast of the peninsula, like that of the east, is composed of sand-hills eighty feet high, of a red colour, peaked and intermixed with grit stone. A few wretched plants spring from the soil, but in several places vegetation appears with greater vigour, and furnishes more abundant productions.

Several ponds of salt water, in general of a circular form, occupy a part of the surface, and salt was found on the margin of the pond nearest to the observatory. A haven, named *Montbazin,* extensive in length and tolerably spacious, but so much encumbered with sand-banks, (or supposed to be,) that it seemed doubtful whether a boat could navigate it, reaches to the ponds. It was ascertained, during an excursion in search of the natives, that this great sheet of water communicated with the sea.

It is from a rough sketch by M. Gabert, that the ponds and haven of Montbazin have been traced in the map; but as he had no instruments, the shape of these waters, and particularly the place of their embouchure, is doubtful. This creek is, however, a very

curious cut, (*coupure,*) and the French think that the unknown parts of Shark's Bay contain similar openings.

The surface of the peninsula, with the exception of the wood near Point Guichenot, as viewed from the top of one of the hills at Point Shoals, presents an immense tract of level ground, sandy and barren, only broken by Montbazin Haven, which extends in the direction of the coast. The whole peninsula is seen from the above hill. Of five lakes passed by the French in their excursions, three were dried up. The ground was every where sandy, red in some places, covered with shells, and encumbered with parasitical brambles. The footsteps of some unknown animals were noticed, but they only saw one kangaroo. In returning to their camp, they saw a prodigious number of seals, which contended no doubt with clouds of pelicans, assembled at the south point of the cove in Seal's Bay, for the sovereignty of the place.

Thus far the description of the peninsula. Its naked sandy soil, which is expressly said to be "not contrary to vegetation," and its want of fresh water, are disadvantages which may in my opinion be overcome by degrees, by the perseverance of a party stationed there on board ship, whose first business should be to sink one or two wells, and cut a tank or cistern; for as it is well known that no trees (except the cocoa-nut and mangrove) will vegetate in a soil saturated with salt water, we may confidently rely on coming to plenty of fresh water, by digging in the vicinity of the trees above Point Guichenot, a spot so fertile in vegetables of large growth. Neither would the party be in want of manure, where the waters teem with such an abundance of fish of various descriptions, which make the best manure. Shells also, and all sorts of rubbish thrown up by the sea, when burnt, afford good manure. It would be best at first to import timber for the roofs and other portions of buildings, instead of cutting down the wood of the place, which, with other trees to be planted, it would be good policy to preserve.

It appears singular to me, that it never struck the minds of the French, that possibly the absence of the natives, which was often remarked for long periods, was occasioned by their journies to the mainland for fresh water. They might also carry supplies of water in bladders with them in their visits to the peninsula; for I should myself consider that their residence there was only occasional and temporary, during their fishing seasons, or in the absence of other food elsewhere; and that they would be found in greater numbers in the interior of the mainland, perhaps settled in the vicinity of some fresh water streamlet.

But be the peninsula never so sterile, it is amply compensated by nature in the profuse productions of its surrounding waters, which abound in prodigious quantities of fish, and especially in large whales of the profitable kind.

Captain Freycinet states, that Dampier's Bay offers good holding

ground for an anchorage, (with plenty of firewood on shore, and an inexhaustible stock of sea turtle on the shoals and shores.) The landing is, however, difficult at times. M. Arago says, "The point of Dampier's Bay, where we are now lying, affords a secure anchorage, though the south-west winds blow here with violence; but the sea never runs very high. Landing is extremely difficult, on account of the sand-banks, which stretch into the sea for a league; indeed it is scarcely practicable, except at high water. Accordingly, a boat that was sent ashore the day after our arrival, (August 1818,) was swamped half a league from the land, and it was not without infinite trouble that we got the still ashore, and the tents that were to form our camp." But these sand-banks do not appear any where else in Dampier's Bay, but at the south cove called Seal's Bay, so that it is probable the landing may be easier elsewhere.

Pearl oysters are found in the greatest abundance among the surrounding small islands, and might recompence advantageously the researches of a pearl fisher. At seven in the morning the French used to collect their oysters: the reefs were studded with them, and, as the tide was out, they were not obliged to go into the water.

The prodigious number of whales proves that a commercial speculation in a fishery would be successful, and the subject is adverted to by the French voyagers, in several places in their works, with much confidence.* The amazing shoals of these fish struck the French with astonishment. During the three months of July, August, and September, they literally crowd the harbours, and endanger the boats.

Although turtle are plentiful all the year round, yet the month of August is the season when the shoals and sand-banks to the east of Faure island are covered with sea turtle, from which circumstance they were named Turtle Shoals. Some of these animals weighed from 250 to 300 lbs.

Faure Island lies about two miles to the east of Cape Petit, and is nine miles long, six or seven broad, and 21 in circumference. There are several easy landing places in the little bays on its eastern side. An indistinct view of the unexplored coast of the continent is obtained from the highest point on the island.

Supposing a party were to be stationed on board a vessel, for the express purpose of sinking a well and cutting a tank on the peninsula, the employment of stills to distil salt water for drink, would only be necessary during the first summer season, by which time one or more wells and a cistern might be finished. The French, with one still, distilled eighty pints per diem, which was sufficient for the thirty men they had on shore, and it was not disagreeable,

* "Voyage de Découvertes aux Terres Australes." Par Péron. 2d Ed. 8vo. Paris, 1824. Vol. I. Pp. 238, 395. Also "Navigation et Geographie." Par L. Freycinet. 4to. Paris, 1815.

but only had a smoky flavour, which was dissipated by stirring and aerostating: this still was very imperfectly constructed. Capt. F. says, "had it been complete, it would have produced 400 pints of fresh water from salt water in twenty-four hours, a quantity sufficient for the daily wants of 200 men."

I am quite aware that the difficulty of perhaps having to work through a deep stratum of sandstone, will be objected to my proposition of sinking wells; but I am not without experience on this particular subject. At Bangalore I sunk a well through red earth and pipe-clay to a depth of 30 feet, which work was done by no more than two men. And, at Bellary, I had succeeded in sinking a well through nothing but granite to the depth of 10 or 12 feet, and should have perfected it, had I not been removed to another part of India. I therefore know that an operation of this kind only requires a determined and persevering mind; neither does it consume such a length of time as might be supposed. I believe that a well might be made near Point Guichenot in thirty days, to the depth of as many feet, through solid sandstone the whole way; as well as that a tank or reservoir might be cut in the rock or excavated in the soil, if dimensions sufficiently capacious to save enough water, in one rainy season, to last a small community till the return of the next. And the rubbish, during the operation, might be carried aside in baskets or barrows, as in India, in default of better conveyances.

Fish, turtle, eggs, &c. in abundance, would afford a constant supply of fresh provisions, and that, too, of a nutritious quality, until hogs, goats, and possibly buffaloes, (imported from India,) increased sufficiently to afford a change of provisions.

I have not the least doubt in my own mind, but that any kind of vegetables, and especially our Indian sorts, (brinjauls, bandikies, yams, &c.) would grow in the soil of the little valleys; and the party might also try the planting of several kinds of timber and fruit trees; and, besides avoiding a wasteful destruction of the little wood at Point Guichenot, they might increase their stock of timber by planting during the rainy season, selecting only such wood as thrives best in the soil. It is astonishing how easily cuttings, stakes, and young trees, take root during the wet seasons, and how speedily they grow in a warm climate.

Although the most profuse waste of firewood has been going on at that place by the natives, in the large fires they make to warm themselves, without ever planting a single tree, yet nature fills up the waste by this speedy growth.

The anchoring grounds within the islands of Dirk Hartog, Doore, &c. which shut in Shark's Bay, are safe, and well situated for ships passing up and down the coast requiring occasional shelter; in fact, Capt. P. P. King says, that this bay affords the only safe anchorage on the whole line of the west coast of Australia; of course exclusive of Cockburn Sound. Probably, on further examination

of, and a better acquaintance with the haven of Montbazin, it will be found capable of making a good boat harbour; and, if so, it would seem as if Providence pointed out the very spot for a fisherman's village. A party once established, and occasional assistance rendered them, in the way of live stock, seeds, and young trees, as well as domestic articles, the hand of industry would in a few years work such a change around the little settlement as would ensure its permanency; for it cannot be doubted but that the soil of the little valleys, where "the vegetation was magnificent," may be cultivated to advantage. Besides the fishery, the pearl trade, and seal-skins, it is not impossible but that a traffic, perhaps, for many other articles from the interior, not now known or thought of, might be established, and the place thus support itself by its trade.

Perhaps the best plan for the establishment of the fishing settlement, would be for Government to grant the exclusive privileges of the harbours and waters of Shark's Bay to a firm of British merchants for fifty years. It would then be worth their while to sink some capital in improvements; and, as they would be sovereigns of the place, they might levy a toll, or harbour dues, on all ships trading or putting in there, the same as is done at the Cape of Good Hope. This, together with the profits of the speculation, would soon bring back the first outlay, and continue an advantageous concern.

But even if the experiment should not be attended with success, it would, at all events, be an excellent post for fitting out a land expedition, for the exploration of the neighbouring parts of the continent; and as soon as the examination was completed, and no more could be done for geography in that quarter, the place might be abandoned. The natives would be left somewhat improved by the short intercourse, and be more friendly to Europeans,—a result, that may be attended in future years with the happiest effects.

M. Péron ascertained, beyond a doubt, by procuring some teeth and bones, that the dugong of the Indian Ocean was an inhabitant of the waters of Shark's Bay. Our ancient navigator Dampier, who also collected some bones of the same kind of animal here, thought it was a hippopotamus; but, as Péron justly observes, these amphibia are never found separated from fresh water rivers, and cannot exist in sea water. The dugong, on the contrary, is not an amphibious animal, and cannot exist out of salt water; it resides continually in shallows at the bottom of the sea, where it has been seen feeding on the herbs in numerous troops.*

In conclusion, the prodigious diurnal vicissitudes of the climate of Shark's Bay, from the burning heat of the mid-day sun to the excessively cold dews of the night, previously spoken of in this

* Leguat, Vol. I. p. 94-96. Also the Edinburgh Journal of Natural and Geographical Science, Vol. I. p. 161, for some account of the dugong.

paper call from me the following remark, viz, that excepting the nights in India not being quite so cold, I consider the climate at Péron's Peninsula, as described by the historians of the French expeditions of discovery, to be exactly similar to that of India: and I feel confident, that Europeans would in time become enured to it as well as the natives, because they would enjoy much greater advantages; inasmuch as they would have the protection of good houses and clothes against the cold of the nights; be fed with better food; and their occupations and fatigues by day be less severe, and under some regulation.

Had these voyagers resided some years in India, and been accustomed to a hot climate, they would probably have represented the physical characters of this peninsula and its climate as not quite so bad; at least they would not have made it out to be so murderous as they thought it; but, being fresh from sea, and unfitted to support the heat on land, (like many others who live on board ship, and in the constant enjoyment of a moist atmosphere and occasional fresh sea breezes,) it felt, and appeared to them, as altogether a spot so dreadful as to be perfectly uninhabitable.

If due allowance be therefore made for the circumstances under which the place has been so imperfectly explored; it will not appear either so impossible or so dreadful a site for a small colony of fishermen; and the utility thereof, and the benefits which may grow out of it, are incalculable.

Note.—It is remarkable that none of the writers give the names of the trees on Péron's Peninsula; but there is a passage in one which says the vegetations is similar to that on the south coast.

Dampier, in his bucaniering voyage, says that he found several little wells of fresh water, (or holes,) close to the sea shore, in New Holland, about the latitude of 16° (N.W. coast.) And I can state, from my own knowledge, that, on various parts of the coast of Southern India, I have seen wells of fresh water within a few yards of the sea; and the sands in which they were dug are nearly as low as the surface of the briny wave itself. This fact makes me feel still more confident of the possibility of coming at fresh water on Péron's Peninsula by digging.

SCIENTIFIC REVIEWS.

Elements of the Economy of Nature, or the Principles of Physics, Chemistry, and Physiology, founded on the recently discovered Phenomena of Light, Electro-Magnetism, and Atomic Chemistry. By J. G. M'Vicar, A.M. 8vo. Pp. 630. Adam Black, Edinburgh, 1830.

Mr M'Vicar is a gentleman and a scholar. He is moreover a man of genius, and, better still, an amiable man, possessed of a strong and searching mind, led—through a maze of erroneous speculations perhaps, yet still led to the great end of all true philosophy—to sublime and reverend views of the Framer of universal nature. Ever since we knew any thing of Mr. M'Vicar, we have thought well of him; and though there is very much in his book of which we disapprove, yet even for his book we think the better of him. There is a vein of deep thought running throughout the whole, a wide knowledge of nature and natural phenomena, and general views extending still wider, which bespeak a man who *can* do something, and to whom therefore Science has a right to say, you must do something. Whether the production of the book now before us be the best way in which its author could have employed himself, is a matter on which we fear there will be but one opinion.

Such regard we entertain for Mr. M'Vicar personally; and we have been thus open and honest in expressing it, as we mean to be equally open and honest in examining the views and statements of the book before us. It is a curious and interesting book, but at the same time rather heavy and difficult to be read,—written in a style occasionally flowing, but more generally stiff and harsh, and often singularly obscure, especially where the author propounds his peculiar views, as if his mind were labouring to bring out some lofty thought, which he can only half express, perhaps because only half conceived. But we shall pass from the manner of the book, and turn to the matter of it, with which perhaps we have more to do. One word only in regard to the general confidence of our author in propounding his opinions. We like him all the better for advancing his opinions boldly; for we hold that few men have ever attained to literary or philosophic greatness, who felt not, long before, from some inward and irrepressible burnings, that they were destined to and deserved their fame; and yet we are bound to say, that the self-confidence of an author, whatever it may do to himself, will carry no conviction to the public that his speculations are deserving of being received.

Elements of the Economy of Nature,—such is the title of the book. It professes to unriddle all the phenomena of nature from the movements of the planets, and the evolution of light and heat to the hidden motions of atomic matter in developing the material

forms of the various orders of animated beings. Through this wide field we cannot follow it; but conceiving that the first and surest test of the system here propounded, is to be found in its application to atomic chemistry, we shall confine ourselves at present to this, the main department of the work, reserving the physiological portion, should time and occasion permit, for consideration in some future number. In this branch of science alone can we grapple with the mechanical forms, particles, and molecules the author has built up. In animal and vegetable physiology we have few definite data to guide us, so that while physics have long shaken off almost entirely the dominion of hypothesis, these branches of knowledge still remain an open field for theoretical speculation.

The work is divided into four books. The first treats of the *structure and action of matter;* the second of the *radiant medium;* the third of *chemical and natural substances;* the fourth of *animals and plants.* Before entering upon the third book, which occupies about 300 pages, it will be necessary to lay before our readers a view of the principles on which the illustrations of Mr. M'-Vicar are founded. It is a matter of disadvantage to the reader of his book, that he has not himself set out with a concise view of his system, separating what is *assumed,* what is *inferred,* and what is *demonstrated,* but has so involved it, and mixed it up with other matter, that he has at length found himself obliged to refer to page 508, for an outline which had more properly formed an introduction to his whole work. So far as we have been able to understand him, however, we find the following positions maintained:—

1. There are two kinds of matter,—*hard or atomic matter,* and *motorial* or *subtle matter.*

2. The ultimate atoms of *hard* matter are impenetrable, elastic, highly angular, uniform in size, and have the form of the regular tetrahedron.

3. The *subtle* matter every where invests the atomic matter in quantities which are variable and specific. The form of an atom invested by its subtle matter is a perfect sphere.

4. The *radiant medium,* that which fills up the intervals between all dense bodies, consists of these spheres symmetrically related and fixed in their positions by their mutual attractions. It is "the common vapour of concrete matter."

5. Subtle matter attached to the *angles* of atomic matter, gives rise to the phenomena of attraction and permanent adhesion,—to those of *gravitation,* of *aggregation,* of *crystallization,* of *cohesion,* and of *magnetism:* attached to the *surfaces,* it gives rise to the phenomena of repulsion and rarefaction, to *light, electricity,* and *galvanism.*

6. *Heat* consists in a tremulous motion in the atoms of bodies.

7. When the attractive power predominates over the repulsive, the atoms of hard matter unite in different numbers and posi-

tions, constituting different forms; and hence result the various kinds of matter we meet with in nature.

Besides these there are many other subsidiary positions or suppositions, to which it is unnecessary for us to advert. We are to consider the fundamental position, that the ultimate element of all kinds of ponderable matter is one and the same, and, then, the forms assigned to the various chemical bodies in the work before us.

We willingly grant the praise of sublimity to the ancient opinion, that all ultimate matter is simple and one, and we think that the speculative mind might be so lifted beyond itself by the thought, as to generate conceptions regarding the framer of the universe of the most exalted and heart-purifying character. We are not therefore opposed to it; on the contrary, we can occasionally indulge it, and feel ourselves made better by the high and reverend thoughts to which it gives birth. But here we would stop, and we think the man acts idly, and is guilty of wasting time and talents, who, in grappling with this lofty opinion, would bring it down, and connect it in detail with the forms and qualities of matter. We have ourselves indulged in theory regarding the atomic constitution of bodies, but we never once equalled ourselves to the daring task of pronouncing, *a priori,* thus, and thus has nature wrought. We came not down from above to survey the mysteries of the economy of matter, but climbing up by the slow and patient, yet sure method of induction, we endeavoured to find out the limit to which our present strength would carry us, satisfied that what we could not now achieve, future minds more able or more fortunate might possibly accomplish. That man will ever reach that clear and definite knowledge which this book pretends to convey, we do not believe,—that he will ultimately come infinitely nearer than his narrowed vision now permits him, we are fully persuaded; and were it not that we are borne up by the conviction, that the "first bound of the emancipated spirit" will be gladdened by the revelation of all the hidden mysteries and machinery of the material universe, we should look forward with envy to future times, and esteem those men the happiest who lived to see most of what the human mind could do.

But the truth is that the human mind will never, in this life, be able to compass universal nature. Already has the field of science become too wide for the comprehension of one intellect, and as it stretches out every day still wider, it will become every day more difficult to assign general laws to which all phenomena can be reconciled. Mr. M'Vicar is a high-minded man, and he possesses a general if not a minute knowledge of natural science, to which few can pretend; but in the only department, that of atomic chemistry, which, having vindicated to itself in some measure the title of an exact science, was fitted to put his opinions to the test, we consider him to have completely failed. And he has failed, we conceive, not from lack of talent in himself, but from the utter im-

possibility of succeeding by the method he has adopted. He may comfort himself by the words of Virgil,

> " Si Pergama dextrâ,
> Defendi possent, etiam hac defensa fuissent ;"

or by the ancient quotation of Longinus,

> " μεγάλων ἀπολισθαίνειν ὁμῶς εὐγενες ἁμάρτημα ;"

being assured that naked theory will rarely pass now for true philosophy, and that while theoretical views are little regarded, even when propounded by experimental men, they are not likely to call forth greater attention from the pen of a merely speculative philosopher. Another thing we must say. Had our author called his book an *attempt,* we should have felt bound to notice it favourably as an able and ingenious attempt. Had he sent it forth as a *view* of the way in which nature *may possibly* have gone to work, we should have said it was a curious and interesting production, and highly deserving of being read ; but advancing, as he does, so decidedly, and laying down the law as if nature had kindly called him to her councils, we are obliged to show upon what shallow and insufficient grounds he has generally proceeded.

We shall state then first what we are prepared to admit on the subject of atomic chemistry.

1. We admit as *probable* that the atoms of all bodies are angular, and for this simple reason, that cleavage, carried as far as we may, never shows us any thing but angular fragments.

2. That these angular atoms are all definite geometrical forms.

3. That the ultimate atoms of whole families of bodies, while they differ both in mechanical and chemical properties, agree in having the same geometrical forms ; or, in other language, are isomorphous.

4. That a chemical atom denotes probably several ultimate atoms.

5. That a limited variety of atoms, differently arranged and united in different numbers, may produce compounds possessing very different properties, as we find to be actually the case in the animal and vegetable kingdoms.

6. That the simple or undecompounded substances of chemistry, *may* therefore be compound, and *may possibly* be formed in favourable circumstances, though we have as yet no experimental proof of such being the case.

Thus far we are warranted in going ; our third and fifth positions being the only ones that have been demonstrated.

Mr. M'Vicar, from certain considerations connected with its form as the most perfectly angular, *assumes* the regular tetrahedron to be the shape of his universal atom. Invested with subtle matter, these tetrahedrons form the radiant medium,—this also is

of course assumed. Two of these tetrahedrons united by two planes form a double triangular pyramid, which is the base of all ponderable matter. This figure is called a bi-pyramid; the central part, where the bases of the pyramids meet, is called the equator, and the apices of the pyramids are the poles of the figure.

Now, having obtained this element, the forms of the different kinds of matter are deduced in the following way:—

Hydrogen. "Of all known bodies, we naturally expect to find that hydrogen gas possesses the most simple structure. Every circumstance induces the belief that it is more immediately connected with the radiant medium than any other. Now, of all the combinations of the atoms of matter, none is so immediately obvious as that produced by two atoms applied base to base. This is a particle of hydrogen gas,—its atomic weight is two!"

Water. "When six particles of hydrogen unite by their equators, there results a senate molecule of most admirable symmetry. This senate molecule of hydrogen is a particle of water. That water consists entirely of hydrogen, may be shown by decomposing it in a very highly electro-negative medium, adverse to the development of an electro-negative form." The atomic weight of water is consequently 12. But it "often aggregates into ternate molecules.* Next to this there is the septenate molecule, which consists of a particle in the centre, with six around it, one on each of its edges. But that which performs the most important part in the economy of nature is the senate molecule, which results from the approach of six, and contains in the centre a hexagonal pore.—A double molecule, in which one particle is above another, the poles not being in contact, also frequently occurs." After all this, we are astonished in the following page to find the following:—"*A single particle of water is, doubtless, very much too small for being seen,* so that we cannot obtain sensible evidence that it possesses the form which is here assigned to it!" Why, one would have thought he had actually seen, as he has assisted in getting up, these forms; and yet the proof of the whole is, that when built up according to a certain fashion of Mr. M'Vicar's, these aqueous particles constitute forms similar to those observed by Mr. Scoresby and others in snow-flakes and crystals of ice.

Oxygen. When by any means a particle of hydrogen is driven out from the circle of six which constitute water, the circle is of course diminished to five particles, and the "spendyloid form which results is named oxygen. Its atomic weight is 10." For this no proof is pretended to be given; but it is assumed, we suppose, that water, consisting of six particles of hydrogen, if we take away one, the remaining five must of course constitute oxygen, because water is decomposable into oxygen and hydrogen. But our author has

* In the language of this work a *particle* is synonymous to the chemical atom, —*a molecule* is made up of several particles.

added two remarkable facts to our former knowledge of this matter: *first,* "that the decomposition of water into the two free gases now considered, is probably only a chemical experiment, and never occurs in nature to any great extent," (p. 238.); and *second,* that oxygen "is never met with in nature in a free state, nor can it be insulated in the laboratory; its properties are consequently unknown," (p. 241.) Chemists generally consider oxygen gas to be constituted of the radical oxygen, and caloric, which does not affect its chemical properties; but Mr. M'V.'s heat is merely vibration, and his oxygen consequently is an entirely new substance.

Vital or Empyreal Air. Oxygen "always affects the aeriform state, and thus exposed to the incidence of radiant matter, an atom perches in its pole as hydrogen does, and the *oxygen becomes vital air.*" The only thing in the shape of a reason for this compounding of vital air, we find in the following lines:—

"When we consider the unipolar electrical state of a particle of oxygen, and the susceptibility of an atom of the radiant medium contiguous to its pole, to have an opposite state induced upon it, we will not hesitate for a moment to believe, that, as soon as oxygen mingles with radiant matter, it will unite with it as it does with hydrogen, by receiving an atom in its pole." P. 241.

Nitrogen. "Suppose, by a violent compression in the direction of the equator, that a particle of hydrogen is driven in towards the centre, its presence there forms a mechanical obstacle to the evolution of the form of oxygen, and the five remaining particles are under the necessity of uniting by their apices, and a form results, possessing symmetry enough to exist for some time. This is a particle of nitrogen."

Thus azote is a result of the decomposition of water, "and that such decomposition," says Mr. M'V. "must take place abundantly in the ocean, both on its confines with its own basin and the sunbeam, we can scarcely doubt." We confess we not only doubt, but we absolutely discredit all such fanciful resolutions and compositions; and, supposing them actually to take place as here described, we have not a particle of evidence before us to prove that figure evolved as above, has any claim to represent the form of azote. But our author finds the five particles which constitute azote, capable of three arrangements, of which he deigns to inform us, that "the two small forms continue in the ocean, but the large symmetrical one is aeriform." Such writing requires no comment. But nitrogen has also other forms. "It is not only developed in the decomposition of water, but is an abundant product of animal assimilation. While it remains in the organization of animals, however, there is every reason to believe that it exists in a solid state, or as an icosaedron; and if so, the icosaedron may be regarded as the characteristic form of the animal structure." And so it is concluded, of course, that the icosaedron *is* the characteristic form of the animal structure. And yet this is a fair specimen of the kind

of reasoning as to forms, which constitutes the essence of the whole book before us. When we saw the great parade of new and nameless forms displayed in the plates; and in the references found one to indicate an atom of oxygen, another an atom of phosphorus, a third an atom of chlorine, &c. all as faithfully and accurately drawn as if the atoms of these substances had actually sat for their likenesses to Mr. M'Vicar, we felt as if philosophy had achieved a great discovery, and we suspended all opinion on the facts of the case, till we should search the work itself for the evidence from which these forms derived their character; but we searched the book in vain, and we can find no evidence for any one form better or more trust-worthy than what we have quoted above. They are in fact, all of them, mere fancies from first to last, little better than the scratches of the Row prophets, which they choose to call Chinese.*

Could our readers desire a finer tissue of gratuitous supposition than the following, which occurs in page 33?

"If nickel and cobalt recognize the magnetism of iron, and are really magnetic in a similar manner, it is to be inferred that some considerable part of their form is isamorphous with iron. As to that very general attraction of small bodies, exercised by the magnet, in as far as it is purely an attraction, arising solely from the influence proper to the angles of particles, it seems to arise from the iron which they contain; for where is there a body that may not contain iron? And, as to those south and north magnetic poles which are found at the summit and base of most bodies, the iron, in their composition, may be the means of enabling us to recognize such an interesting fact, becoming thus, by its universal diffusion, to the magnet, in reference to the attractive influence, what light is to the eye in reference to the repulsive, but it is not to be inferred that the iron in them alone possesses these polarities. This mutual disregard, however, bears in its quantity a certain relation to the quantity of difference between the dissimilar bodies; and it may be that there is scarcely any form in nature that might not acknowledge the influence of a vigorous magnet, by attractions and repulsions. As to rotation, it is probably the effect of the re-action of the subtile matter of dissimilar bodies, though much more eminently in those which are most nearly allied."

It may be amusing to our readers to see how one or two more of the atomic forms are deduced. That of *Carbon* is attained by the following summary process:—

"In our inquiries into the atomic constitution of natural bodies, we are naturally anxious to find a form to suit the properties of carbon, which, after water itself, performs the most curious and admirable part in developing the beautiful series of organic forms. We have seen that there is something very eminent in the structure of water and nitrogen, the other organic elements; doubtless we may expect the same in carbon. Now, the form into which atoms of matter resolve themselves most simply, after hydrogen itself, is that of a pentagonal bipyramid, for which the mind immediately contracts the prejudice that it is carbon. Its atomic weight is 5." P. 313.

* A new religious sect, whose devotees claim the gift of tongues, has recently sprung up at a place called Row, in the west of Scotland. "This celestial gift, it appears, consists in uttering certain articulate sounds, without any meaning attached to them, but which are supposed to be a language; and in forming on paper certain marks or characters, supposed to be either letters or words."

Silicon. We are sure our readers will feel grateful to us for the information we are the happy instruments of conveying to them, by quoting the following passage from page 432.

"When describing the structure of the radiant medium, it was shewn that eight atoms, circumscribing an octaedral cavity, might be regarded as its molecule. Of all the forms of the universe, this, then, may be regarded as the most extensively diffused; and though, in the radiant medium the atoms are prevented from cohering, yet where atoms are sufficiently near each other, this form, composed of eight atoms, with an octaedral cavity, may be constantly expected. It is that which bears the most intimate relationship to the matter which occupies the celestial spaces, and this, as well as the ease with which atoms may group in this form, will induce to its evolution. It is very natural to assume that this body must be silicon, which is, of all substances in the earth, by far the most universally diffused."

We have neither time nor space to refer to all the inconclusive conclusions as to forms which the book contains; for one of the very worst, we refer to *Alumina,* pages 448-9. The following on *Iron* is too exquisite to be omitted.

"It has been shewn, that a particle of alumina consists of atoms circumscribing a cavity, which is a hexagonal prism; that the base of potass consists of atoms circumscribing a pentagonal bipyramid; that the base of silica consists of atoms circumscribing a tetragonal bipyramid; that the base of lime consists of atoms circumscribing a triangular bipyramid. What form shall possess such eminence in nature as to be composed of atoms circumscribing a tetraedal cavity, which is the form of the ultimate atom itself? This is iron, a substance so universally diffused in nature, that it would be difficult to find any natural body whatever, in which we could positively say that there was no particle of iron in it." P. 463.

And on the distribution of iron we have the following: "Such are some of the forms of combination in which iron is most frequently found in nature and in the laboratory; but to trace the modes of its existence minutely would require volumes. It is perhaps generated at the first breath of the youngest creature in the world, and it is abundant in the oldest granite"!!! Children breathing iron! Truly we have reached the iron age at last. And yet all this is philosophy; it forms part and parcel of the economy of nature. But it is ridiculous to treat such fantasies with any thing like serious attention. Lest our readers, however, should think we select the weakest portions, we request as many of them as can lay hands upon the book, to read the chapter upon iron, which professes to be one of the greatest efforts it contains, and to judge for themselves of the ease with which whole hosts of phenomena are accounted for and explained. Mr. M'Vicar's atomic forms are in truth little better than a tissue of random guesses, upon which the powers of an ingenious and gifted mind have been idly wasted; for we reckon as merely accidental, or, more properly perhaps, natural coincidences, all the instances of agreement between the combinations of which his forms admit, and those actually found in nature,—coincidences which would probably be found by assuming any other form for the ultimate atoms, and building them according to known physical laws.

It is strange that any man should place such reliance upon forms deduced in the way above shown, as to permit himself to call in question, or to modify the results of experiment. And yet there is hardly a received atomic weight which the book before us does not state to be more or less in error, and few chemical compounds in which the ratio of the composing atoms has not been hitherto misunderstood. Nay, the author has even found out new compound bodies, and given them names, without having even seen or knowing how to form them, and all because he finds that a certain number of particles of two *assumed* forms, which he *supposes* to represent certain substances, are capable of being built together into a figure of more or less symmetry. To the knowledge of two of these compounds, Citrogen and Pyragyne, or Pyragynic Acid, we shall introduce our chemical readers.

Of citrogen it is said, "We cannot avoid the conclusion that particles of carbonic acid abundantly generated from a violent combustion or otherwise, should apply themselves to each other in the nascent state, so as to generate other molecules than those of mineral fixed air. Thus two particles of fixed air might retain a particle of carbon in the cavity between them, which is conformable; and if the molecule only attained to this structure when escaping from the region of combustion, in this state it might ascend into the gasometer. Such a form is completely isamorphous with common fixed air, and none of the tests for carbonic acid would be sufficient to distinguish it. To prevent circumlocution, it may be called Citrogen, for a reason soon to be perceived. Its atomic weight is 35." P. 336.

And of pyragyne the author writes, "In all cases where oxygen is supplied in abundance, and where the conditions are most favourable to combustion, a completely burned sort of carbonic gas may be expected, in which there are three particles of carbon and four of oxygen." This he calls pyragyne or pyragynic acid. Experimental chemists are content to wait for the discovery of substances before they name them, but your theoretical men can give to any "airy nothings a local habitation and a name." We dislike all prophetical hints and anticipations either from practical or fanciful men; and we see no claim any philosopher, either ancient or modern, has to the title of a wise man, merely because out of fifty idle guesses one or two turn out at last to be true.

The ratio of the elements of chemical compounds, is deduced by our author after the following manner:—Silicon has a certain form noticed above. Five particles of this form must be built up with four of oxygen before any symmetrical figure can be obtained; therefore silica is a compound of 5 silicon + 4 oxygen. All known combinations, and many unknown, are deduced in this way, and were we sure of our fundamental forms, nothing could be safer or more accurate; but while these forms are all fanciful, nothing can be more useless or absurd.

Mr. M'Vicar has a high reverence for antiquity. He admires Plato, because he threw out the conjecture shown in the book before us to be true, (!) that the form of flame is a pyramid. He quotes Boyle as an admirable man, on account of his chemical results; and Boerhaave has no small share of his adoration. He laments the disuse of old names too. "It is to be regretted," he says, "that the names given by the fathers of the science are so completely forgotten; for it is not right, without some good excuse, to change a name which has been given by any one to the substance he has discovered or first described." Kind, good soul! And therefore we find him talking of calx, and argil, and vitriolate of iron, and ferrane, and phosphorane; and therefore, no doubt, he hopes that when his new carbonic gases are discovered, they will be called citrogen and pyragynic acid. We cannot, of course, compel other chemists to adopt a particular nomenclature, but should it be our own lot to fall in with these two non-descript gases of Mr. M'Vicar's, we shall certainly so christen them.

One meets with little passages now and then in the course of the work, at which one cannot help smiling. Speaking of the formation of bodies from their ultimate elements, the author quotes the experiment of Sir H. Davy, in which, during the decomposition of water by the galvanic battery, in an agate vessel, he obtained notable quantities of soda, and adds,

"He satisfied himself, however, that it was derived from no other source than the cup, because he did not obtain any, when the water was acted on in gold vessels. But the silica of the agate has a great affinity for soda, and would dispose to its evolution according to well known and acknowledged principles, while gold has no such affinity. *Hence, though soda was not developed in the gold, it does not follow that it was not developed in the agate.*" P. 240.

And in page 312, he says,

"Spirit of salt, or oil of vitriol, united to ammonia, may be handled without the fingers suffering, and this we ascribe to the circumstance, that the acid is neutralized by the alkali. But if our fingers, like those of a calcined statue, happened to be made of lime, we might almost as well handle spirit of salt as sal ammoniac; and it would be true, that, in as far as our sensations were concerned, the acid united to the sal ammoniac was as little neutralized, as with our present fingers we find it to be when it is united to water."

But we must bring our remarks to a close, adverting first to two errors in matters of fact which we have happened to meet with. All the experiments hitherto made, tend to show that ammonium, or that compound of azote which forms an amalgam with mercury, consists of one atom azote and four atoms hydrogen. Mr. M'V. (p. 309.) takes away hydrogen from his ammonia, in building the form of his ammonium, and makes it to consist of one azote to two of hydrogen.

In page 465, he says,

"Crude or cast-iron, in the solid state, possesses rather a less volume than in the liquid state; but solid cast-iron floats on liquid cast-iron like wood upon wa-

ter, and even when pressed to the bottom of a pot of liquid metal, it rises to the top. These phenomena indicate that we are not acquainted with the specific gravity of iron, when it is not affected by the terrestrial magnetism."

We know not upon what authority Mr. M'V. makes this statement as to the volume of cold cast iron, but we should have thought that the circumstance of its swimming on melted iron would have led him at once, without hesitation, to an opposite conclusion. For the fact is, that cast iron is classed with ice, bismuth, antimony, and most saline solutions which occupy a greater space when in the solid or crystallized, than when in the liquid state, being exceptions to the general law of expansion by change from the solid to the liquid state; and it is to this very property that iron owes its great utility in founding. Its expansion on cooling causes it to take a good impression, and thus the most delicate figures may be cast in iron, while in gold or silver they must be struck.

There are many other topics discussed in the work under review, into the consideration of which we should have been happy to accompany our author. But we have already trespassed beyond our usual space. In the meantime, having done so much for theory, we would urge Mr. M'V. to turn his attention to experiment, and his opinions will speedily undergo modification. It is not impossible to combine large views with minute experimental research, (though it is stated by Mr. M'V. that "to limit our researches by actual experiment, is to exclude ourselves from the inquiry;") but we think it is impossible now for any one so to master the wide field of science, rambled over in the volume before us, as to enable him to lay down the law of nature in regard to her most minute and most abstruse phenomena. We are not averse to a little theory: it is, on the contrary, pleasant and refreshing, as connecting at once and relieving the dryness of mere experimental results; but it must be rational and chastened theory, such as is derived from experiment, as waters from a fountain, and which, like the stream skirting the mountain ridge, shall at every step receive fresh accessions from similar sources; and, disappearing not for a time like the fabled rivers of classic Greece,—not losing itself utterly among sands as in eastern deserts, shall preserve a continuous and unbroken course, showing a manifest and consecutive connection with its parent spring, till it reach its legitimate and final destination. From other theory than this, it is the boast of our age to have escaped, and the splendid results due to the inductive method, must be forgotten ere it will trust itself again to the sophism of *a priori* speculation.

On the present state of Science in Great Britain.

No. IV. *Wernerian Natural History Society.—(Resumed.)*

In the eighth number of this Journal, for May last, we expressed our satisfaction at having "instigated an investigation, by the independent members of the Wernerian Society, into the singular condition of their mis-directed institution;" and it was our intention not to have made further allusion, for the present, to the proceedings of the Committee which had been appointed, leaving the zealous members to pursue, systematically and undisturbed, the good work of reformation which was begun. But we find ourselves unexpectedly forced from our meditated silence, by the appearance of a sort of official document which has has recently obtained circulation under rather an equivocal form.

The history of the Wernerian Society, with respect to the subjects of which we have before spoken, is simply as follows:

So far back as 1824, complaints were occasionally heard in the Society, against the inefficiency of the system by which it was regulated; for it was found, in particular, that the advantage to be derived from the library of the Society could not be shared by the members, as the room in which it was reported to be contained was not open to them, except on the days of the Society's meetings; and when any applications for books were made, the general answer was that they were not in. And in December of that year, Mr. Falconar of Carlowrie moved that the Council make particular inquiry into the state of the library.

A committee was accordingly appointed by the Council for this purpose, but for reasons hereafter to be stated, nothing was done. After the lapse of three years, (1827,) the system continuing as heretofore, Mr. Falconar again found it necessary to bring the matter before the Society, and the committee were requested *to expedite their report.* About a month afterwards, however, though the committee had not yet given in any report, a meeting of Council was called by the secretary, under the president's direction, and a list of the books was given in by Mr. James Wilson, the librarian. It was then agreed that, *as a preliminary step,* a notice be added to the next intimation of the Society's meetings, earnestly calling upon members who may have borrowed books from the Society, to return them without delay. And in this *preliminary* condition matters remained till this present year, (1830,) the interval being marked by no new circumstance, except the election of Mr. Macgillivray to the newly created office of assistant librarian, in November 1828.

In the beginning of the present year, we were led by circumstances to examine into the condition of the Wernerian Society, as one of the scientific institutions which had formerly been held to be of considerable importance in this country,—an institution which was favourably known to us by several volumes of transactions which it had published during a period of seventeen years, and more particularly by the numbers of celebrated names which swelled its list of members. The investigation which we conducted, soon showed to us that the Society had been for some time in a dormant state,—that no transactions had been given to the public for the last five years,—that the members were unacquainted with the state, or even the present existence of a library or museum, though many donations were known to have been presented to the Society,—and that, as is almost invariably the result of laxity in the forms of a public body, and of permanency of office in the executive powers, several abuses had crept into the management of the Society, which required correction before any thing in science could be done. For instance, it was well known that the president, who is the editor of a scientific journal, was in the constant habit of appropriating to his own use the papers which ought to have formed part of the Transactions; and if a member asked the librarian for any particular volume, (which was of very rare occurrence,) it was found that the books had never been delivered over to him,—that he had no catalogue of the library,—and that he did not even possess the key of the case in which it was believed that a portion of the library was contained.

From these facts it was evident that some change was required, if Edinburgh was to possess a Natural History Society, which might bear any equality to the rank and respectability of the University, in whose bosom it was placed. And, as we had entered upon the task of ascertaining the state of science in this country, it became a duty with us to make known the results of our inquiries, which accordingly appeared in No. V. (p. 352,) of this Journal, for February 1830. We therein published statements which have only been corroborated by subsequent information, and we then challenged contradiction from those best acquainted with the Society's affairs.

About this time a busy activity pervaded the Wernerian Society. The abuses became a subject of conversation; and, in the month of April last, Mr. Falconar, for the third time, made an effort to stay the progress of the Society's ruin. The Council was in consequence again directed to examine into the state of the library, and to procure a new catalogue of the books, &c. in the Society's collection; and an inquiry into the state of the funds was also set on foot. A committee of the Council was appointed to the duty, and their labours are now in progress.

From the above narrative, whose accuracy is open to refutation by any one who can dispute it, it will appear sufficiently clear that we have already done some little service, at least in our own city. And after having congratulated ourselves upon success, we could not but be surprized to find that a circular had actually been put forth, for the mere apparent purpose of depriving us of the credit of having occasioned the renewal of the investigation into the library, and, in addition, an inquiry into the nature and condition of the Museum of the Society. Had this document confined itself to a statement of facts, without indulging in party-coloured explanations, we should have passed it over unnoticed; but the ridiculous attempt to rob us of any little merit we may have obtained by our labours, together with the doubtful form under which the circular appears, seem to require from us a brief analysis of its true scope and design.

The apology for this publication is contained in the following words:

"*Erroneous notions* being in circulation regarding the *occasion* and *objects* of the inquiry into the state of the Library and Collection of the Wernerian Society, the following *correct statement*, taken from the Minute-book of the Society, seems called for."

Now, we think the occasion and objects of the investigation will be tolerably understood from the above details; but we give the document at length.

"On the 4th December 1824, it was 'moved by Mr Falconar of Carlowrie, and seconded by Dr Charles Anderson, and unanimously agreed to, That it be an instruction to the Council to make particular inquiry into the state of the books belonging to the Society, and to have a list made up without loss of time.' (*Minute-book*, p. 230.)

"'Thereafter, the Council having met; in pursuance of the preceding instructions, appoint Mr G. A. W. Arnott, Mr Alex. Adie, and Dr Robert Knox, a committee to make inquiry as to the state of the books belonging to the Society, and to take steps for getting a complete list of the books made up and printed for the use of the Members.' (*Min.* p. 231.)

"Mr Arnott having gone to the Continent, the Committee delayed to report; and after the lapse of three years (during which period, however, such Members as demanded books were furnished with them,) Mr Falconar and Dr Anderson brought the matter again before the Society, 15th December 1827, and the Committee were 'requested to expedite their report.' (*Min.* p. 279.)

"About a month afterwards, Professor Jameson directed the Secretary to call a meeting of Council on this business; and accordingly, on 26th January 1828, 'the Council met and took into consideration the state of the books, &c. belonging to the Society. A list of the books made up by James Wilson, Esq. the librarian, was laid before the meeting. It was then agreed that, as a preliminary step, a notice be added to next billet, earnestly calling upon Members who may have borrowed books from the Society, to return the same without delay. It was likewise agreed that, thereafter, the librarian, or a member of the Society acting in his place, should be requested to attend on each Saturday

on which the Society meets, at One o'clock P.M., for the purpose of giving out and receiving books.' (*Min.* p. 281.)

"Mr Macgillivray had hitherto assisted in arranging and keeping the books, without holding any office in the Society; but at the election of office-bearers for the year 1829, (held on 29th November 1828), 'Mr Macgillivray was elected assistant librarian,' (*Min.* p. 290); and this appointment, it was hoped, would both relieve Mr Wilson, and promote the object in view, of facilitating access to the books.

"Although books were as heretofore furnished by the Librarian to Members requiring them, difficulties, it appears, still occurred, arising chiefly from the circumstance of the Society not possessing a separate apartment of its own, which might *at all times* be accessible to the members. On 17th April 1830, therefore, in consequence of a letter addressed to the president, (signed among others, by Mr. Falconar the original mover for the Committee of 1824, and by Mr. Arnott, the senior member of that Committee), it was 'agreed that a Meeting of the Society be called for Saturday 24th April, to take into consideration the present state of the library, and other matters connected with the Society.' (*Min.* p. 307.)

"Accordingly, on 24th April, 'the Society met, R. Jameson, Esq. P. in the chair; and after hearing such Members as inclined to deliver their opinion, the following resolutions were moved by the Rev. Dr David Ritchie, 1. That the Council of the Society (viz. Professor Jameson, P.; Mr Witham, Dr Adam, Dr Greville, Mr Falconer, V. P.; Dr Boggie, Rev. Dr Brunton, Mr Stark, Dr Aitken, Sir A. Nicholson, Dr Gillies, Rev. Dr Scot, Dr Anderson, with the Librarian, Treasurer, and Secretary *ex officiis*, and with the addition of Mr G. A. W. Arnott) be directed to examine into the state of the library; to cause to be made up a new catalogue of the books, &c. in the Society's collection, with a note of such articles as appear missing; and to suggest what regulations may be suitable for the management of the library in future; and, as soon as they are ready, to call a general meeting of the Society, to receive their report. 2. That the Treasurer be directed to furnish to the Society as soon as he can, a state of the funds realized, and also of the sums due to, and debts due by, the Society, as far as ascertained.—These resolutions were seconded by Dr Walter Adam, and unanimously adopted by the Meeting.' (*Min.* p. 308.)

"With the view of following up these resolutions, the Council met on the 1st of May; and, 'after some consultation, it was unanimously agreed, that the following gentlemen be appointed a Committee for the purposes mentioned in the minutes of the Meeting of 24th April last, viz. Professor Jameson, Mr. Falconar, Dr. Gillies, Mr. Arnott, with Mr. Wilson, librarian; Professor Jameson, convener, and three to be a quorum. The Committee to meet on Thursday 3d June next, at Twelve o'clock.' (*Min.* p. 309.)

"PAT. NEILL."

Of this detail, which from its demi-official form, and numerous quotations from the minutes, we might suppose to be accurate, almost every paragraph which is not actually an extract, is either a misrepresentation, or a true representation of a censurable fact.

In the first place, it is stated in the 3d paragraph, that "*Mr. Arnott having gone to the Continent*, the Committee delayed to report; and after the lapse of three years, (during which period, however, *such members as demanded books were furnished with them*,") the matter was again brought before the Society. Now it is notorious, and we have the authority of Dr. Knox, a member of the Committee, to assert, that they did not delay because Mr. Arnott was gone to the Continent, for the Committee was quite independent of Mr. Arnott's presence, and, moreover, there was abundance of time before his departure for the transaction of all the business. The truth is, that *the Committee were not permitted to enter the room** where the books were said to be kept. And on application to the li-

* It is generally stated that, on the institution of the Wernerian Society, it was entered as a clause in the code of laws, that all specimens presented to the Society should be deposited in the Museum of the College, for the behoof of the members; a sort of bargain which was made for the use of the Museum apartments, in which the Society at that time met. It has turned out to be rather an unequal barter, however, under the present circumstances; and we would

brarian, they found that the books had never been delivered into his possession, and that consequently he had no catalogue, and indeed knew nothing about them. Here, then, was a hopeless case; they neither knew what to look for, nor where to look; though suspicion pointed to the place where most of the books might be found. The committee were culpable in not reporting to the Society, at this time, on the true condition of things.

Again it is said, that "such members as demanded books were furnished with them." A mere equivocation! for during the whole period of the Society's existence, there have not been above twenty applications from members for the use of books,—and for the best reasons;—they did not know what books were in the Society's library, and no access to the room was permitted except on the days of meetings; and that no books were given out on such days, is evidenced by the minute quoted in the 4th paragraph, that in 1828 it was agreed "that *thereafter*, the librarian, or a member of the Society acting in his place, should be requested to attend on each Saturday on which the Society meets, at one o'clock P. M. for the purpose of giving out and receiving books." We only ask the fabricator of the tale, to show to any one of the members the book which contains the receipts for volumes borrowed, if the mummery of procuring such an useless book has been observed; and it will at once testify how many members "were furnished" with books from the library.

In the 5th paragraph we find it stated that "Mr. Macgillivray had hitherto assisted in arranging and keeping the books, *without holding any office* in the Society." We need say no more, in explanation of this most unwarrantable assumption, than that Mr. Macgillivray was the "private secretary" of Professor Jameson, the president of the Society, and that it shows plainly enough who had the use of the books.

But in 1828, "Mr. Macgillivray was elected assistant librarian," though he was not at that time an ordinary member of the Society; "and this appointment, it was hoped," says the circular, "would both relieve Mr. Wilson, and promote the object in view, of facilitating access to the books." Mere *persiflage!* Why, the books were not in Mr. Wilson's care, and access to the room continued to be as impossible as before.

In the 6th paragraph, the writer's boldness increasing with the apparent successfulness of the historical details, the equivocation is repeated in a less deceitful form. "Although books were as heretofore furnished *by the librarian to members requiring them*," (it is fortunate for the truth of this statement that NO *members required them;* indeed that, during his whole officiate, the librarian has not given out twenty volumes,) "difficulties, it appears, still occurred, arising chiefly from the circumstance of the Society not possessing a separate apartment of its own, which might *at all times* be accessible to the members." We have already stated that the room was *at no time* accessible to the members, except on the days of meeting.

Thus far it has been managed to keep within the bounds of truth, but a trying fact came now to be stated, which, if candidly acknowledged, would negative the whole tenor of the document. "On 17th April 1830, in consequence of a letter addressed to the president, (signed, *among others*, by Mr. Falconar, the original mover for the committee of 1824, *and by Mr. Arnott*, the senior member of that committee,) it was "agreed that a meeting of the Society be called for Saturday 24th April, to take into consideration the present state of the library, and other matters connected with the Society." Here the great object of the circular is divulged; for the sole purpose of denying the true cause of the appointment of the present committee, by connecting it with the old committee of 1824, has all this trouble been taken. What sensations, then, will the framer of that statement feel, when we declare, upon evidence and with confidence, that *Mr. Arnott did not sign that letter*, and that *no other names were attached to it than*

recommend the Council to look into it, *and particularly to order the laws to be printed forthwith*, for it certainly is the merest drivelling to put one's head blindfolded into the despotic yoke.

those of Mr. Falconar and Dr. Gillies, which latter gentleman had no connection whatever with the old committee.

Paragraph 7th. "On the 24th April the Society met," and "the following *resolutions* were moved by the Rev. Dr. Ritchie, 1. that the Council of the Society be directed to examine into the state of the library," &c. &c. This statement again is incorrect. It is of no service now to ask why the Council did not perform their duty, without being continually urged and re-appointed; but it had become evident that the surest way to carry the business through, was to have a special committee for the purpose, and the attempt was made at this meeting;* this proposal, however, was overruled by the president, and the Rev. Dr. Ritchie, seconded by Dr. Walter Adam, moved, *as an amendment on the previous motion for a special committee,* and not as an original resolution, that the Council, to whom Mr. Arnott was afterwards added, be directed to examine into the state of the *books, &c. in the Society's collection.* As most of the active members of the Society were on the Council, the amendment was allowed to pass; but since that period, the Council have appointed a committee from their own number to perform this onerous duty. At the time of the re-appointment of the Council to the investigation of the library, it was suggested by a member that the *Museum* of the Society came under the general duty delegated to them,—"the books, *&c. in the Society's collection.*" And such is the fact, as shown by the quotation: but this was too sore a subject; and the president could not prevent himself from interfering, with the remark, that they had already enough on their hands with the library, and they had better complete that first. Of course, the Council will do their duty to the Society, and not permit themselves to be blinded to the actual words of the motion by such a manœuvre.

The 8th and concluding paragraph states that "the Council met on the 1st May," and "appointed a committee for the purposes mentioned in the minutes of the meeting of 24th April, viz. Professor Jameson, Mr. Falconar, Dr. Gillies, Mr. Arnott, with Mr. Wilson, librarian; *Professor Jameson, convener.*" But who had the indelicacy to name the president convener, when it was well known that against him the inquiry was, in point of fact, directed? *He named himself, though another gentleman was proposed.*

Such is the nature of this circular, which has apparently cost so much labour and management in the manufacture. And it would show want of candour on our part did we not afford it the highest encomium for neatness of execution and general fitness to deceive. But it is fortunate for us, in our office of Censor, that we were bred to the study of natural history, where the analytical powers of the mind are in constant exercise, and where it is a principle that all the individual facts must be examined before the generalities can be allowed.

But the most unaccountable circumstance connected with this document remains to be noticed. Nobody knows whence it came, nor to whom it is addressed. It certainly bears the signature of Mr. Neill, the Secretary of the Wernerian Society, and has been directed to several members of the Society. But these facts make the matter doubly mysterious. By whom was the circular ordered to be printed? Did the Council see it necessary to go the expense, however trifling, of explaining to the Society "the occasion and objects" of their appointment? Surely the Society, when it met on the 24th April, was sufficiently aware of its own motives, not to require any explanation from its Council, why it delegated to that Council a particular duty. But we know that the Council did not direct the publication of this circular, and did not even know of its existence till it was sent to the several members. Was it, then, the act of Mr. Neill, whose name is subjoined? We cannot suppose it; for it certainly is not customary for secretaries to take upon themselves to dictate to the society which they serve, on these mat-

* The Council of the Wernerian Society has been hitherto rather an inefficient body; but their excuse is, that they have never been summoned to meet, except on some very extraordinary occasions. At all events, we know that the President has had all the trouble of performing their duties.

ters; and that he did not commit himself in such an unadvised action on his own responsibility as a private member, we think we know too much of Mr. Neill for one moment to conceive. Indeed we consider it but justice to that gentleman and to ourselves to state, that though from his office he has the misfortune to have his name mixed up with these transactions, not a thought of blame can attach to him, except for want of firmness to resist the "foul devices" which are sometimes "whispered in his ear." We trust we shall not offend that retiring delicacy which so eminently distinguishes him, if we join the voice of all who know him, in the profession of unlimited esteem for his character and talents. "There are several societies," says Mr. Babbage, "in which the secretaries and other officers have very laborious duties, and where they are unaided by a train of clerks, and yet no pecuniary remuneration is given to them. Science is much indebted to such men, by whose quiet and unostentatious labours the routine of its institutions is carried on."—(*Decline of Science in England.* Preface, p. xii.) And such a man is Mr. Neill.

If, then, Mr. Neill did not subscribe his name to these statements from the dictates of his own will, he must have been induced or obliged to do it by some other person; and this seems the more probable that the usual form in such circulars is in this case neglected. The customary mode of signing similar official papers is "*By order of the President,* Pat. Neill, *Sec.*" But this authority has been cunningly removed from the signature, and "PAT. NEILL" stands in isolated singularity at the bottom of the page.

It is not clear, then, from what source this circular has emanated. The Council, however, ought to inquire into it; for the attempt to influence the minds of members and others during an investigation which might come to assume considerable importance,* is as wicked as to tamper with a jury in the discharge of a duty where conscience is the arbiter.

But we have stated that it is equally incomprehensible to whom the "correct statement" is addressed. That it cannot be intended for the attending members of the Society is palpable, for they knew well enough what they were about; and we have been unable to learn that it has been received by any of the absentees. We presume, then, that it has sprung from the suggestion, that *Iræ hominum transibunt, sed scripta nostra maneant;* and upon the same principle we now answer it by the above analytical investigation into its truth or falsity.

Several of our friends who have seen the circular, though they were fully aware of its true bearing, have suggested the propriety of our taking no notice of it, as they were afraid that our interference, under the present circumstances, might have an injurious effect on the labours of the committee; and that besides betraying an apparent hostility to the interests of the Society, we should, by exposing the misdeeds of any of its members, excite a degree of odium against an institution to which Scotland had looked up with pride, and of which she still formed the highest expectations. But we know the value of publicity in defining the limits of good and evil; and we could only reply to our advisers, in the sentiments of Babbage, that *the party* which governs it, is not the Wernerian Society; and that the justness of their remarks could only have applied, if the whole body, on becoming acquainted with the system we have exposed, had, by ratifying it by their approbation, appropriated it to themselves: an event which has not, however, occurred. (Introd. p. xiv.)

* The custom in Societies is, if the librarian is unable to show any receipt from a member, or otherwise to account for works missing from the library, that he be responsible for their value; but no responsibility can rest on Mr Wilson, as the books were never delivered over to him. The Wernerian Society will therefore have to look to those who had immediate custody of the books, for the supply of any deficiences which cannot be accounted for. We trust there will be no serious losses discovered on comparing the articles in the library and museum with the list of donations and purchases in the Secretary's minutes.

GEOGRAPHICAL COLLECTIONS.

Notice of the Island of Tristan d'Acunha in the Atlantic.

Mr. Earle, who gave a description of this island, lived at Tristan d'Acunha with the Governor Glass and his family. There were then on the island four men, two women, and some children, who subsisted miserably by killing seals and selling refreshments to ships. Since that period they have quitted the island, and a farmer and his wife from England, who were going to New South Wales, have established themselves there. The following account of the appearance of the island, and the manner of the inhabitants' living, is from a letter in the Sydney Gazette.

" The circumstance which first offers itself to my memory of the voyage, (to Calcutta,) is having touched at Tristan d'Acunha, probably the largest and most fertile of a group of three islands, which are situated between the Cape of Good Hope and South America. Tristan d'Acunha is about eight leagues in circumference. The shores of the two other islands are so dangerous, that they can only be approached in the calmest weather. One has the name of Nightingale ; the other is called Inaccessible. The appearance of Tristan d'Acunha, to the north-east, is very striking. At the foot of an almost perpendicular mountain of 9000 feet in elevation, and covered with thick shrubs, exists a beautiful plain of a vast extent, which borders the shore.

" We had scarcely cast anchor when we saw two men approaching us in a little boat. As soon as they were on board, they expressed to us the extreme pleasure which they felt at our visit, for no ship had come near them for several months. They told us that they were the only men who lived on the island, and that the wife of one of them was the only woman. The husband was an Englishman, and had been at one epoch of his life a rich farmer in Yorkshire ; but being ruined by a series of misfortunes, he and his wife had been induced by an old acquaintance, captain of a merchant vessel, to accompany him, without paying any thing for their passage, to New Holland, to endeavour to retreive their fortunes. The ship having occasion to touch at Tristan d'Acunha, the farmer and his wife were so charmed with the country, that they determined to remain on the island instead of continuing their voyage. After having vainly sought to turn them from this project, the captain gave them European grains, two cows, sheep, poultry, and what other provisions they had on board, and, obliged to depart, they bade a sorrowful farewell, and left them to their lot.

" They were the only human beings on the island ; but it was evident that there had been somebody fixed there a few months previously ; for they found a hut ready to receive them, and several acres of land that bore the traces of recent culture.

" They had scarcely inhabited the island the space of one year, when a Dutch vessel stopped there to procure water, and one of the crew, who was displeased with the captain, hid himself in the island till the departure of the vessel. He was received with kindness by the Yorkshire farmer, and remained with him to the moment of our arrival. The Dutchman was then disgusted with the life which he led at Tristan d'Acunha, and he begged our captain to take him on board, when he would work as sailor to pay his passage. The captain having yielded to his request, the man appeared as pleased as if he had escaped from prison. He, however, showed to his companions the greatest regret at leaving them.

" After having offered to the farmer some amusing books, some woollen clothes, a couple of barrels of powder, a quantity of flour, rice, and biscuit, we accompanied him to the shore, and we were enchanted with the air of satisfaction and of prosperity which reigned in the habitation. His wife, both good-looking

and cleanly dressed, received us at the entrance of the house. In answer to our questions, she assured us that, as they had no children and few relations, they had not the slightest desire to return to England for some time; but that when the infirmities of age should overcome them, they would quit with joy, on the first favourable occasion, their solitary residence, to pass the remainder of their existence in their native country. They were then in the flower of their age, and perfectly satisfied with their lot. They listened with a sort of pride to our encomiums on their flourishing condition, and our surprize at seeing the land so well cultivated. The climate being perfectly temperate, and the soil light, they had given all the desired perfection to a great variety of European, as well as tropical fruits and vegetables. They had in their yard the two cows of which we have already spoken, many English pigs, some sheep, goats, and poultry, enough to afford them a daily supply. They seldom killed the wild boars, wild goats, or a species of black-cock which abounded in the island.

"In the deep waters among the rocks, several species of fish were found. The mountains were literally covered with water hens, petrels, albatrosses, and the different feathered tribes which are met with in the South Atlantic. As seals are very abundant there, our insular inhabitants had preserved a great quantity of skins, to exchange them for other merchandize with the ships which might touch at Tristan d'Acunha. We ourselves having obtained our supply of fresh water at one of the limpid fountains of the mountain, we bade good-bye to this little romantic isle and its two interesting inhabitants."

Hydrography of Russia.—(Continued from p. 212.*)*

Few of the great Asiatic rivers can course to the south, because they have their origin at the northern foot of the great mountains which separate Russia from Mongolia and Mandjouria. It is not the same in Europe. In advancing from the east to the west, the first we meet with is the *Oural*, which forms the limits of the two continents. This river, formerly called Jaik, and Rymnus by the ancients, has its source on the western acclivity of the chain of mountains to which it owes its present name, under the 54th degree of north latitude. After flowing some distance to the west, from the fort of Orsk to that of Ouralsk, it turns to the south, to empty itself, after a course of about 700 leagues, which divides the Bachkirs and the Kirghese in the vicinity of the Caspian Sea.

To the west of this river we meet with the *Volga*, whose long course is of so much importance for the internal commerce of Russia, and for the markets of its two capitals. This river is the longest in Europe; for it traverses a distance of about a thousand leagues, while the course of the Danube has only about 450 leagues of development. It takes its origin from a lake situated at the foot of the forest Volkhouski, in the government of Tver, in the environs of Ostuchkof. Originating as a rivulet at Reif, where it becomes navigable, it is not more than 90 feet in width. Thence it flows constantly to the east, though with considerable windings to Kasan, where it attains a width of 600 feet. Its principal navigation begins at Tver. Afterwards it traverses Ouglitch, Rybinsk, Jaroslarl, Kostroma, Nigni-Novgorod.

The *Kama*, a considerable river which descends from the Ural, joins the Volga in this place, after a very long course. In the environs of Saratof, it is above 1200 feet wide, and near Astrakan its width is nearly five leagues at high water. From Kasan it directs itself constantly to the south, and after having received, on the right, the Oka and the Soura, and on the left the Tvertsa, the Mologa, the Chexna, the Kostroma, the Ounga, the Vetlouga, the Kama, and the Saneara, it throws itself by seventy arms into the Caspian Sea.

Its course is through beautiful hills, regular, calm, and often limpid, but at the time of the melting of snows, it often is the cause of great ravages. More than 5000 boats charged with productions, annually descend this river, so abundant in fish. The ancients called it Pha, and sometimes Araxes; its Tatar name, which signifies abundance, is Idel, Edel, or Adal, and the Merdouins at the present day call it Rhan.

The *Don*, if we judge by the direction which it follows for the greatest length of time, would appear to intend throwing itself, with the Volga, into that immense mediterranean lake to which its dimensions have given the name of Caspian, in the environs of Tsaritsine; it appears even to wish to mingle its waters with those of its majestic rival, whose bed, lower than hers by about 50 feet, is not at a distance of above fifteen leagues, and is separated by a tract of sandstone. This river, celebrated in antiquity by the name of Tanais, was formerly regarded as constituting the limit between Europe and Asia.

It is from three to six hundred fathoms in width, but its depth being very inconsiderable, and its course very slow, it is not of much importance to the internal navigation. Its bed contains nevertheless neither rocks nor large stones, but is formed of sand, marl, and chalk. Sand-banks and little islands are often met with. The Don issues from Lake Ivanof, and in the government of Toula it successively receives the Voronege, the Khoper, the Medveditsa, and the Donerz, and after some long windings, and a course of about 230 leagues, it empties itself by three arms into the Sea of Azof, below the town of that name, a putrid and marshy sea, which is almost indebted to this river for its existence.

The Dnieper, by the ancients called Borysthenes, is more to the west, and discharges itself into the Black Sea, between Otchakof and Kinbourn, after having formed a bay of fifteen leagues in length, and from about half a league to two leagues in width.

The sources of this great river, which for a long time formed the natural limit of Russia, are very near those of the Wolga, both being in the marshes of the government of Smolensk. It runs in a westerly course to Orcha, when it takes a southerly direction. Its course, of a very safe navigation as far as Smolensk, is interrupted a little lower by cataracts formed by masses and blocks of granite. It afterwards becomes navigable for a distance of about 400 versts to the sea. It is more than 360 leagues in length, and at Keif is traversed on a bridge which is 3583 feet long. The rivers which feed its stream are, to the left, the Sokb, the Dessna, and the Soula; to the right, the Beresina, the Pripetz, the Rass, a river which receives the same name as the empire, and the Boug, a river which, originating in Podolia, empties itself into the bay or lake formed by the Dnieper. This last becomes navigable at Drogobouge; its bed is deep; its borders very elevated; and its waters rapid. It also abounds in fish.

The Dniester, called Tyras by ancient geographers, issues from a lake situated in the Carpathian mountains in Gallicia. On entering Russia near Kamenetz, it follows a south-easterly direction, to empty itself into the Black Sea.

Up to 1812, it formed the boundary of Russia against the Ottoman monarchy, but the peace of Bucharest placed this frontier on the Pruth and the Danube. The Dniester is navigable, and offers to the provinces, formerly Palish, an outlet for their corn. It forms at its mouth, like the Dnieper, a lake between Akerman and Ovidiopol.

Lastly, several of the Russian rivers flow to the west. They are, to commence with the most southerly, the Kuban, the Niemen, the Duna, and the Neva.

The *Kuban* forms, with the Terek, the limits of the empire between the mountaineers of Leghistan; the courses of these two rivers form nearly a straight and uninterrupted line. The *Kuban*, called *Wypaius* by the Greeks, descends from the mountain of Cháto, one of the most elevated of the Caucasus. Like most of the Russian rivers, it is confined in a narrow bed. It begins by flowing to the north, then turning to the west, it empties itself by one arm in the Black Sea, and by the other into that of Azof. This last is more rapid than the other,

which, slow and less deep, is very navigable for all vessels that do not draw much water.

The *Niemen* is one of the principal means of communication between western Russia and the other countries of the north; for on it all the commerce of Lithuania and of Podolia is transacted. It forms the limit between Russia and Prussia, from Grodno, when it begins to flow to the north, as far as Jourbourg, at a short distance from Tilsit, when, at the same time that it enters upon the territory of the kingdom of Prussia, it takes the name of Memel, which it carries afterwards to its mouth in the Baltic Sea. Its source is in the government of Minsk, but before arriving at the frontier, it again traverses those of Vilna and of Grodno.

The *Duna*, called by the Russians *Zopadnaia Dvina*, that is to say Western Dvina, and by the Lettons *Daugava*, originates near the sources of the Volga, in the forest of Volkhonski, in the government of Tver. From Velige, where it is already navigable, to beyond Vitebsk, it courses parallel to the Dneiper and the resulting opening.

After a navigable course of 250 leagues, which is slightly interrupted by some cataracts in the vicinity of Dunabourg, it empties itself into the Gulf of Riga, a little below the sea-port of that name, at Dunamunde, where its width is imposing; but at its mouth sands prevent large vessels ascending as far as the great bridge of Riga, about 900 feet long. Though its affluents (the Toropsta, the Bolderaa, &c.) are not considerable, this river is of great importance to commerce.

Lastly the *Neva*, which traverses the beautiful capital of the north, and gives to it a new character of beauty, has a course of only fifteen leagues through the government of St. Petersburg from Lake Ladoga, to which it serves as an issue to the Gulf of Finland, into which it empties itself before Cronstadt by several arms. This majestic river, though it divides itself into Neva, Great and Little Nefka, and several other arms that water Petersburg, is every where broad, navigable, and rapid, and it is unfortunate that its limpid and healthy waters should sometimes threaten the existence of the capital.

Establishment of the Trial by Jury amongst the Native Inhabitants of the Island of Ceylon.

Few civil improvements have ever been introduced among a people of a more extensively beneficial nature than the communication to the native inhabitants of Ceylon, (the only settlement in India that is directly under the government of his Majesty,) of the right of acting as jurymen on the trial of their own countrymen for criminal offences, and the consequent resolution of the proprietors of slaves in the same island, that all children born of those slaves, after a certain date, should be born free. The following passages, which we extract from a key published with an engraving of Mr. Ackerman's, convey a brief but perspicuous history of the two interesting occurrences to which we have alluded :—

" Sir Alexander Johnston, when first member of his Majesty's Council in Ceylon, having conceived that the best mode of insuring the stability of the British authority in that part of the world was, to admit the natives to share the benefits of the institutions of our free country, was deputed in 1809, by the governor and council, to submit, in his official capacity, to his Majesty's ministers such measures as he thought best calculated to accomplish this object. The ministers having approved the measures thus recommended, caused a charter to be issued under the great seal of England, granting to the natives of Ceylon the right of sitting upon juries, and of being tried by juries of their countrymen. Sir Alexander having returned in 1811, with the appointment of chief-justice and president of his Majesty's council in Ceylon, lost no time in carrying the provi-

sions of this charter into effect ; and it was at his suggestion that the proprietors of slaves in the island, by way of manifesting their gratitude to the sovereign of a free nation for having granted to them and their countrymen the rights of freemen, unanimously resolved, that all children born of their slaves after the 12th of August, the anniversary of his Majesty's birth, in the year 1816, should be considered as free, and be brought up at their expense till the age of fourteen ; thus associating for ever in the minds of their posterity, the memory of his majesty with all the blessings which are to be derived from a state of freedom.*

" The introduction of the trial by jury among all the classes of the natives of Ceylon, without distinction, has been the means of gradually removing the religious jealousies which prevailed among them, and habituating the people of all the different religions, and of all the different nations of Asia, resident in the island, to attend together the proceedings of the supreme court, both as jurors and spectators.

" Owing to the continual intercourse kept up between the natives of Ceylon and the people of Hindoostan, the privilege granted by his Majesty to the former soon became generally known and desired throughout the British empire in the East ; and, induced by the success which had attended the introduction of the measure in that island, the parliament, by an act passed in 1826, extended the same right to the natives of all the British territories in India. Hence, the trial by jury is now become an object of general interest to more than one hundred and twenty millions of people, inhabiting countries containing upwards of three hundred thousand geographical square miles, and extending from the Gulf of Cambay to the rivers Ganges and Burrampooter, and from the Himalaya mountains to Cape Comorin."

At a time when the future government of India is a subject of public discussion before both houses of parliament, it must be an object of great interest and curiosity to trace the origin and progress of measures which must ultimately produce the greatest moral and political change in the feelings and conduct of the natives of India. Of a few of the benefits which have already been derived from them, the following extracts from a letter written at his own request to the president of the board of control, by Sir Alexander Johnston, in the year 1825, will give some idea.

" The native jurymen, from knowing the different degrees of weight which may safely be given to the testimony of their countrymen, decide upon questions of fact with so much more promptitude than Europeans could do, that, since the introduction of trial by jury, no trial lasts above a day, and no session above a week or ten days at farthest ; whereas, before the introduction of trial by jury, a single trial used sometimes to last six weeks or two months, and a single session not unfrequently for three months. All the natives who attend the courts as jurymen obtain so much information during their attendance, relative to the modes of proceeding and the rules of evidence, that since the establishment of jury trial, government have been enabled to find amongst the half-castes and native jurymen some of the most efficient and respectable native magistrates in the country, who, under the control of the supreme court, at little or no expense to government, administer justice in inferior offences to the native inhabitants. The introduction of the trial by native juries, at the same time that it has increased the efficiency and despatch of the courts, and has relieved both prisoners and witnesses from the hardships which they incurred from the protracted delay of the criminal sessions, has, independent of the savings it enabled the Ceylon govern-

* The number of slave proprietors (being in fact the whole of the slave proprietors in Ceylon) who agreed to this resolution was 761 : and the number of full-grown slaves, male and female, to whom the resolutions applied, was about 10,000.

ment to make immediately on its introduction, since afforded that government an opportunity of carrying into effect, in the judicial department of the island, a plan for a permanent saving of ten thousand pounds a year. No man, whose character for honesty or veracity is impeached, can be enrolled on the list of jurymen; the circumstance of a man's name being upon the jury roll, is a proof of his being a man of unexceptionable character, and is that to which he appeals in case his character be attacked in a court of justice, or in case he solicits his government for promotion in their service. As the rolls of jurymen are revised by the supreme court at every session, they operate as a most powerful engine in making the people of the country more attentive than they used to be in their adherence to truth. The right of sitting upon juries has given the natives of Ceylon a value for character which they never felt before, and has raised, in a very remarkable manner, the standard of their moral feelings. All the natives of Ceylon, who are enrolled as jurymen, conceive themselves to be as much a part as the European judges themselves are, of the government of their country; and therefore feel, since they have possessed the right of sitting upon juries, an interest which they never felt before in upholding the British government of Ceylon. The beneficial consequence of this feeling is strongly exemplified in the difference between the conduct which the native inhabitants of the British settlements on Ceylon observed in the Kandian war of 1803, and that which they observed in the Kandian war of 1816. In the war between the British and Kandian government in 1803, which was before the introduction of trial by jury, the native inhabitants of the British settlements were, for the most part, in a state of rebellion; in the war between the same governments in 1816, which was five years after the introduction of trial by jury, the native inhabitants of the British settlements, so far from showing the smallest symptom of dissatisfaction, took, during the very heat of the war, the opportunity of my return to England, to express their gratitude through me to the British government, for the valuable right of sitting upon juries, which had been conferred upon them by his present Majesty.

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"The difference between the conduct which was observed by all the proprietors of slaves on Ceylon in 1806, which was before the introduction of trial by jury, and that which was observed by them in 1816, which was five years after the introduction of the trial by jury, is a strong proof of the change which may be brought about in public opinion, by the judges availing themselves of the opportunity which their charging the jury on the first day of session affords them, of circulating among the natives of the country such opinions as may promote the welfare of any particular class of society. As the right of every proprietor of slaves, to continue to hold slaves on Ceylon, was guaranteed to him by the capitulation under which the Dutch possessions had been surrendered to the British arms in 1795, the British government of Ceylon conceived that, however desirable the measure might be, they had not a right to abolish slavery on Ceylon by any legislative act. A proposition was, however, made on the part of government by me to the proprietors of slaves in 1806, before trial by jury was introduced, urging them to adopt some plan of their own accord for the gradual abolition of slavery: this proposition they at that time unanimously rejected. The right of sitting upon juries was granted to the inhabitants of Ceylon in 1811. From that period I availed myself of the opportunities which were afforded to me when I delivered my charge, at the commencement of each session, to the jurymen, most of whom were considerable proprietors of slaves, of informing them of what was doing in England upon the subject of the abolition of slavery, and of pointing out to them the difficulties which they themselves must frequently experience, in executing with impartiality their duties as jurymen, in all cases in which slaves were concerned. A change of opinion upon the subject of slavery was gradually perceptible amongst them; and in the year 1816, the proprietors of slaves of all castes and religious persuasions in Ceylon, sent me their unanimous resolutions, to be publicly recorded in court, declaring free all children born

of their slaves after the 12th of August 1816; which in the course of a few years must put an end to the state of slavery which had subsisted on Ceylon for more than three centuries."—*Lit. Gaz.*

Remarks on several Icebergs which have been met with in considerably low latitudes in the Southern Hemisphere, by CAPT. HORSBURGH, Hydrographer to the East India Company, were communicated to the Royal Society at the Meeting of the 4th February last.—The journal of the ships belonging to the East India Company, the author observes, during the whole of the last century, contain no accounts of icebergs having been seen in the course of their navigation in the southern hemisphere, although several of these ships proceeded into the parallels of latitude 40°, 41°, and 42°. But, during the last two years, it appears that icebergs have occasionally been met with by several ships in their passage, very near the Cape of Good Hope, between the latitudes of 36° and 39°. The particulars relating to these observations are detailed in the paper. The most remarkable occurred in the voyage of the brig Eliza from Antwerp, bound to Batavia, which, on the 28th of April 1828, fell in with five icebergs in latitude 37° 31′ S., longitude 18° 17′ E. of Greenwich. They had the appearance of church steeples, of a height from 250 to 300 feet; and the sea broke so violently against these enormous masses, that it was at first suspected that they might be fixed on some unknown shoal, until, on sounding, no bottom could be discovered.

It is remarkable, that, in general, icebergs seem to be met with in low latitudes nearly at the same period of the year, namely, in April and May, in both the northern and southern hemispheres, although the seasons are reversed in these two divisions of the globe. In order to account for the origin and accretion of the southern icebergs, the author thinks it probable, that there exists a large tract of land near the antarctic circle, somewhere between the meridian of London and the 20th degree of east longitude, whence these icebergs have been carried in a N. and N.E. directions, by the united forces of current, winds, and waves, prevailing from S.S.W. and S.W. Bouvet's and Thompson's islands are not of sufficient magnitude; and Sandwich land ond Kerguelin's island are too remote to be the source of the icebergs lately observed in the vicinity of the Cape. From their unprecedented descent during the last two years, it is most probable that the disruption of these masses of ice from the places of their formation, was the effect of some powerful cause, of rare occurrence, such as an earthquake or volcano, which has burst forth and convulsed the inaccessible regions of the south, leaving no other testimonials of the event than some few fragments of ice, scattered at a distance in the Indian Ocean.

Esslingen Society for Botanical Excursions.—In the 16th Volume of the *Bulletin des Sciences*, we observed an announcement that the Society of Esslingen proposed to send out a botanist, in 1829, to explore the Pyrenees, and that another would be charged to collect for the shareholders the plants of Dalmatia, many of which are new. We have now the greatest satisfaction in stating, from an article in the *Hesperus* (24th Jan. 1830,) that the projects of the Society have been executed with the greatest success. The notice contains an enumeration of the principal plants collected in the two countries visited in 1829, amongst which there are a number which botanists must be anxious to have in their herbariums, especially when the specimens have been so well selected and prepared as those which M. Endress has brought from the Pyrenees. This zealous traveller has many times braved the greatest dangers, and even death, to procure the most curious species of the Eastern Pyrenees, in which part alone he has made his collections. The Society being about to explore the other portions of the Pyrenees, we shall thus have a very complete collection of the Flora of this

interesting chain of mountains. M. Endress proposes consequently to visit next summer the High-Pyrenees; in autumn he will devote his attention to the coast of Bayonne, passing the winter there, and going in the spring to the Low-Pyrenees; the rest of the year will be employed in examining the botany of the countries which the traveller has not been previously able to visit. The execution of this plan will depend, however, on the will of the present members of the Society, and of those who shall continue to join it, and co-operate by their subscriptions to the developement of its activity. The committee request them, in consequence, to give their support as soon as possible, and transmit their subscriptions.

We understand, in the interim, that a project is formed for a great botanical expedition to the southern hemisphere in 1832 and 1833, the announcement of which will be published as soon as it is definitively settled.

Notice of the Fellatahs.

The *Gazette Universelle d'Augsburg* has published the following particulars concerning the Fellatahs, from a letter of Mr. William B. Hodgson, attached to the American consulship in the Barbary states.

It is very probable that the Fellatahs will found in future times a very great empire in Soudan, and that this power will play the principal part in the civilization of Africa. If the Sultan Bello abolished slavery in his states, it would be a great step made towards a better state of things. The example given by a great nation, and the influence of its monarch, would soon force the inferior tribes to imitate him; and if once the barbarous wars which these tribes carry on among themselves, for the purpose of obtaining slaves, were done away with, nothing would be opposed to the civilization of these countries; for commerce, which from that moment would establish itself on the coast of Africa, would bring life around every thing. Maroc, Algiers, Tunis, and Tripoli, would thus lose their rich commerce of slaves; and as the Africans could no longer, as in our days, come and exchange in those states their slaves for merchandize of all kinds, they would prefer the more commodious markets of the coast of the Atlantic, to the perilous journies across the deserts. This consideration has in no way escaped the barbarian governments: on the contrary, we know how much they have used their influence, as African nations, to deprive Christians of all free access among them. The American colony of Liberia is called by its position to take a great part in this revolution of commerce, and to draw great advantages from it.

Though Captain Clapperton has already given some detailed information on the history and character of the Fellatahs, the subjoined remarks will not be found void of interest.

The Fellatahs are so named by the Negroes, but they themselves use the term Fellan, or more exactly Faulan; but as this nation is anthropoklepthe, as well as the Tuaryckes, and as it carries away negroes for the purposes of slavery, Fellatah appears to be a term of reproach, like that of Serdu, by which the Negroes designate the Tuaryckes. At Senegal, and on the borders of the Gambia, they are called Fulah and Puhls. Mungo Park designates them under the first of these names, and Mollier under the second. The Fellatah nation extends from the Atlantic to the frontier of Darfour. It speaks every where the same language, of which the following are words, with the singular and plural terminations. The orthography and pronunciation is after that of the English language.

	Singular.	*Plural.*		*Singular.*	*Plural.*
Water,	Dcam.		Moon,	Lauro.	
Fire,	Gheabingol.		Man,	Gorkoo.	Gorhai.
Sun,	Nandjee.		Woman,	Dcbbo.	Eroubai,

	Singular.	*Plural.*		*Singular.*	*Plural.*
Head,	Horee,	Koiee.	Horse,	Putcho,	Putchee.
Eye,	Yeteree,	Gitee.	Cat,	Musoro,	Musodee.
Hand,	Djungo,	Djundai.	Bird,	Sondo,	Chiullee.
Dog,	Rawane,	Dawaree.	Day,	Handee,	Nejandee.
Cow,	Naga,	Nai.	Night,	Djemma,	Baldee.
House,	Sodo,	Oure.	Year,	Dungoo.	Doobee.

The adjectives do not change their genders. The personal pronouns are,

I,	Mee.	We,	Mechorn.
Thou,	Ah.	You,	Ancon.
He,	Kanke.	They,	Kambai.

Possessive Pronouns.

My head,	Hazee am.
Thy hand,	Djuago an.
His house,	Sodo mako.

This vocabulary proves that the Fellatahs are not of Arabian origin, as pretended by a writer in the *Revue Britannique* for January 1829, nor of Berber origin, as Mr. Mollien appears to think. This nation apparently descended from the elevated plateau where the Niger takes its origin, and whose climate appears to be temperate. As the Fellatahs neighbour on Abyssinia, it is probable that they have some relation with the Fallaschas of that country. Bruce says that the latter are Jews, and speak the ancient Ethiopian language, but this language is very little known. The negro idioms have a particular character. An examination of the language of Tibbou, Bournou, Haoussa, and Timbuctoo, prove that they have no declensions either for the genders or for the plural number. Perhaps even their verbs are not conjugated. If we compared the language of the Tuaryckes which inhabit the north, and that of the Fellatahs to the south, with the simple and uncultivated idiom of Soudan, perhaps we should find that there exists as much difference between the languages of Africa, as between the colours of its inhabitants, and that, like them, they may be divided into white and black. This examination might throw a great light on the history of the development of the human species.

Situation and Rural Economy of the Kirgheses of Omsk. By the Sotnick of Cossacks MAKHONIN.—These Kirgheses, about thirty years ago, lived with their flocks out of, but not far from the frontiers of Russia; but the want of subordination to their chiefs, and the disastrous incursions to which their topographical and social situation exposed them, determined them to subject themselves for always to Russia. Government assigned to them a sufficient extent of Steps, when gradually they increased to the present number of 3900 individuals of both sexes. In the deplorable state to which they were almost all reduced, they first sought to gain a subsistence by working for the Russians, then their lot gradually bettered, more especially by bringing up cattle, the only kind of economy which they were acquainted with, and for which these nomades appear to be born. Their flocks increased successively to the present period; and this tribe of 3900 souls possesses 27,080 horses, 5285 horned beasts, and more than 450,000 sheep. These Kirgheses are further, rich in carpets, stuffs, and other domestic effects, and objects of dress in use among the people of Asia.

On several points of the line in which are placed the Russian military posts, some of the rich Kirghese have made, and continue to make, with more or less success, a certain number of agricultural attempts. The example which the nomadic tribes have before their eyes of the happy, and often rapid, progress which the Cossacks make in agriculture and in several branches of European rural economy, fixes more and more the attention of the nomadic tribes of these countries, stimulates their intelligence, tends to tear them from their vagabond life

and habits, and to fix them to the soil without destroying the instinct and native talent of the Kirghese for pastoral occupations. This example will sooner or later make them unite the advantages of the cultivation of fields.

This influence of civilization has been hitherto slow, and far from being general; nevertheless it begins under happy auspices. The contempt and aversion of sedentary employment diminishes every day; and, without presuming too much for the future, we may expect that the solid enjoyments which these occupations procure to the Russians who deliver themselves over to them, will not be long in supplanting the sterile jealousy of their neighbours, and causing it to be succeeded by a wish to participate in these advantages, by devoting themselves to a peaceable industry.—*Agricultural Journal of Moscow.*

Account of the Polish Jews.—"As none of them are engaged in agriculture, they are but rarely to be found in the villages; and being thus assembled in the towns and cities, which are but few, they seem in most of them to form a very large majority of their population. The men have, for the most part, much finer countenances than the other Poles; their forms are better as well as their attitudes and paces; and the long, flowing black dresses which they commonly wear, form altogether a striking contrast with the appearance of their slouching, loitering, idle neighhours. Their eastern countenances and complexions, and the waving beards of many, especially of those advanced to middle age, presented a new and striking feature. They seemed to be always in motion, and yet doing nothing; and it was natural to inquire how such numbers of them could procure the means of subsistence, especially as their wives and daughters seemed to be decorated with jewels or ornaments much more expensive than were to be seen among the inhabitants of the same class in the neighbouring provinces of the Prussian dominions which had just been passed through. It appeared extraordinary in a country where the laws prohibited them from possessing land—where their own indisposition to a rural life prevented them from renting and cultivating that of others—that they should not address themselves to some manufacturing or handicraft pursuits: but such the editor had reason to believe was the case; and all of them subsist by being the retail distributors of the labour of their neighbours in some way or other. They have in their hands all the intermediate operations of the commerce of the country, to such an extent, that every one who wants either to buy or to sell any commodity performs the operation, however minute, through the instrumentality of his Jew. A lady of the highest rank in Poland affirmed, that if she wanted to purchase household linen, clothes, or furniture, she was obliged to employ her own Jew, or she was sure to be cheated. This kind of trafficking habit, though it leads to great wealth with some few individuals of the nation, leaves a great part in the most miserable state of poverty—a state which can only be encountered by the extreme of frugality, approaching to a kind of half starvation; whilst the rags and filth which cover their persons are hid from the eye of the observer by the long dresses of black stuff, which composes their principal but cheap garment.—*Levi and Sarah, a Polish Tale, from the German of J. M. Niemcewicz.*

Miscellaneous Intelligence.—Dr. Von Siebold, whose imprisonment in Japan we had the unpleasant task of announcing in a late number, has been set at liberty, and is, we are happy to find, arrived at Batavia.—Mr. Caillé has published a letter in the *Moniteur* of the 4th May, professing to refute all the doubts expressed in the Quarterly Review, with respect to the authenticity and correctness of his journey to Timbuctoo, "a journey of which a rival nation," he says, "entertains a little jealousy, at the unexpected success of an undertaking, in the prosecution of which it has expended considerable sums, and lost so many distinguished men."—The *Estafette d'Alger*, to be published in Africa, will contain, besides the details of the campaign, pictures of the manners, customs, &c. of the African tribes, and lithographic representations of plans of battles, costumes and scenes of the country.

NATURAL-HISTORICAL COLLECTIONS.

Baron Cuvier's *Lectures on the History of the Natural Sciences.*

Lecture VII. (*Continued.*) Aristotle's History of Animals.—The *History of Animals* is truly a masterpiece. On reading this treatise, it is difficult to understand how the author could have obtained from personal observation so many generalizations, so many aphorisms whose accuracy is perfect, but of which his predecessors had never formed the slightest idea. This book is not, properly speaking, a treatise on zoology; it is a summary, which bears the same relation to this branch of natural science as the *Philosophia Botanica* of Linnæus holds in another department.

The first book treats of the parts which compose the body of animals, which are described, not by species, but by natural families, detailing the peculiarities of each group. Such a labour could not have been performed, had not the author possessed very clear notions on the classification of beings. However, as he has not deemed it necessary to trace a zoological gradation, some individuals have pretended that his work is destitute of method. Such a reproach only evinces a very superficial mind in him who advances it.

The whole of the commencement of this first book is in some degree detatched from the rest, and is intended to serve as an introduction. It is principally composed of general propositions presented without development, but in so clear a manner that any one may understand them, and easily apply them to the natural objects with which he is acquainted. The object of the author has evidently been to fix the attention, by thus assembling in a small space a great number of remarkable results, and to give, in the first place, an idea of the interest which will be found in the study of nature. The most part of these aphorisms indicate the observation of an immense number of particular facts, as may be judged from the following, which we select.

All animals, without exception, are furnished with a mouth, and possess the sense of touch; but these characters are the only two which are indispensible, and we cannot find a third which is not absent in some species.

Amongst terrestrial animals, there are not any which are fixed to the earth; amongst aquatic animals, on the other hand, we know many which are fixed.

Every animal which has wings has also feet. (The author relies upon this observation in denying the existence of dragons, which had been represented as winged serpents.)

Amongst winged insects, many are furnished with stings. Those which carry this organ in the anterior part of the body have never more than two wings; those which have it posteriorly possess four.

Such propositions, it is well known, cannot be formed *a priori;* they are necessarily based on a profound observation of facts, and indicate an almost universal examination of animals.

In this same introduction, Aristotle establishes the foundations of his classification. He divides animals according as they have blood or as they have not; in other words, he separates red-blooded from white-blooded animals. The animals with red blood are quadrupeds, serpents, birds, fishes, and cetacea. Although both the two latter classes live in the water, and resemble each other somewhat in external form, Aristotle, in connecting them, is far from confounding them. He knew the nature of the cetacea as well as we know it now; he knew that these animals have warm blood, that they bring into the world a living offspring, and that they nourish their young with milk from their mammæ. He established also amongst the quadrupeds a well-marked division into viviparous and oviparous; the latter, said he, in their internal organization and their tegumentary system, have a great analogy with the serpents. From this sub-

division, we find the different groups very naturally allied, and it is only in their arrangement that there is any thing to revise.

The white-blooded animals are the mollusca, crustacea, testacca, and insects. This division, certainly, is not altogether irreproachable; however there was not a better till the time of Linnæus. Amongst the mollusca, Aristotle particularly designates the *Octopus*, the *Loligo*, the *Sepia*, the *Argonauta*, remarking that this latter is not attached to its shell. He describes in detail all the parts of these animals, and speaks even of their brain; which is very remarkable, since it is very few years ago that the existence of such an organ in the mollusca was determined.

The subdivisions which he establishes amongst the animals with white blood are still better than his principal divisions; in the insects, for example, it is altogether the classification of Linnæus. He distinguishes the insects according as they are winged or apterous; and of the former composes three sub-orders, distinguished by having wings to the number of two or four, or having them covered with horny cases (*elytræ.*) He then explains what he means by *genus* in zoology, and gives, as an example, the *solipeda*, which he constitutes of the horse, the ass, and the wild mule of Syria (*nemionus.*) It is indeed a perfectly isolated genus, and one of those which we would at the present day select for illustration.

Aristotle, after this introduction, which is presented, as he himself remarks, as a bait to lure towards the study of natural history, passes to the description of the different parts of animals, commencing with the human body, which serves him for a term of comparison, and for the base of his nomenclature. He treats first of the great regions, and of all that is external; then he passes to the examination of the internal parts. There his observations ceased to be so exact. However, the great features of organization were well known to him, and he even appears to have been better informed on some details than most of those who have followed him. He knew, for instance, the Eustachian tube, and speaks of it in the passage where he refutes Alemeon, who contended, as we before stated, that goats respire by the ears. He commences his descriptions with the brain, and states, that this organ is found in all red-blooded animals without exception; but that, amongst white-blooded animals, it is only found in the mollusca. Man, he adds, of all animals, possesses the most voluminous brain. He describes very well the two membranes which envelope this organ, and the different nerves which leave it to be distributed to the eye. But to this single point all his neurological knowledge was confined; he was ignorant both of the distribution and use of the nerves. Herophilus was the first who had somewhat exact ideas on this part of anatomy. Aristotle speaks of the veins whose principal trunks have their origin in the heart; he distinguishes well the venæ cavæ from the pulmonary vein; he describes also the aorta from its origin to its division at the inferior part of the trunk. But he did not know that the arteries contain blood; and seems to have thought that the air penetrates to the heart, an organ which he describes as having only three cavities. He treats of the stomach, the omentum, the liver, the spleen, the bladder, the kidneys and their appendages; he says that the right kidney is placed higher than the left. All these descriptions, although incomplete, and even false in many points, prove at least that he had seen the viscera of which he speaks.

Aristotle next occupies himself more particularly with animals, and first speaks of their limbs. In describing those of the elephant, he remarks, how the length of the fore-legs, and the nature of the joints, render it difficult for this animal to drink and to gather nourishment from the earth; he shows that the trunk supplies this inconvenience, and becomes an useful organ of prehension. Moreover he knew that this trunk is a true nose. He continues, and gives very interesting details on the modes of reproduction of this quadruped, on the differences of the sexes, &c. Buffon has contradicted him on many points, but almost always incorrectly, as is proved by the observations recently made in India.

Aristotle then considers animals under the relation of the distribution of hair. Amongst those which carry a mane, he cites the bonasus, which is the aurochs, (*Bos urus,*) and then three animals of India, the hippelaphus, the hippardium, and the buffalo. The hippelaphus, or horse-stag, has been recently found by MM. Diard and Duvaucel; the hippardium, or hunting leopard, has also been unknown till within these few years. It was in the Royal Menagerie, but Buffon never saw it. As to the buffalo, we know that it was only introduced into Europe at the time of the Crusades. Aristotle describes it in such a manner that we cannot mistake it; he speaks of its colour, of the direction of its horns; he says that it differs as much from the common bull as the wild boar differs from the pig. In speaking of the camel, he already designates the two species, the one proper to Arabia, the other to Bactriana: the last could only be known to the Greeks by the conquest of Alexander.

After having terminated all that relates to the hair, he speaks of the horns, and, on this subject, he lays down general principles whose accuracy has been confirmed by all succeeding observations. Let us instance the following:—

No animal has horns which has the foot undivided; but the inverse rule does not hold; and thus the camel, which has a divided foot, bears no horns.

Those animals which have divided feet, horns, and no teeth in the upper jaw, all ruminate; and, reciprocally, there is not a single ruminant which has not all those three characters.

Horns are hollow or solid: the former are persistent, the latter caducous, and renewed every year.

Our author next speaks of the teeth,—of the manner in which they are renewed in man and in animals,—of the different forms which they have in the different species, according to the nature of their food, being sharp and pointed in the *carnivora,* flat and grinding in the *herbivora.* In some animals certain teeth protrude, and form tusks; but no animal is armed at the same time with tusks and horns. In the elephant, the tusks of the female are small, and directed towards the ground. Here again is one of the propositions wherein we would have thought that Aristotle was wrong. The Indian elephants, indeed, do not exhibit any difference in this respect indicative of sex; but the African elephant, which is that described by our philosopher, has really the peculiarity mentioned.

There comes then a description of the hippopotamus, which accords very ill with the rest of the book. It is very probably by Herodotus, written at first on the margin by one of the early possessors of the work, and afterwards inserted in the text by a less intelligent copyist. We have many examples of similar interpolations.

Before terminating what relates to viviparous quadrupeds, Aristotle speaks of the apes, which he considers as intermediate between animals and man. He points out very clearly the principal characters of their organization, the structure of their hands, and designates many species, some of which have a tail, others which do not possess one. He passes then to oviparous quadrupeds, gives the characters which are common to all, speaks of the nature of their integuments, and on this occasion describes the crocodile of Egypt, remarking the hardness of its scales, the length of its teeth and their form, the disposition of the organ of hearing, and lastly, noticing the principal habits of the animal.

The classification which Aristotle establishes for birds, is very good in the principal divisions: it is exactly Brisson's. He determines the analogy between their wings and the anterior extremities of quadrupeds. He speaks then of the form of their feet, and of the differences which we observe in them,—of the third eyelid,—of the faculty possessed by many of these animals, especially by those whose tongue is fleshy, of articulating some words. He remarks that no bird is armed, at the same time, with spurs and with claws. This again is one of those general propositions which one is astonished to find in the science almost at its birth.

Aristotle comes at last to the fishes, and there he is truly admirable, giving

proof of knowledge on many points superior to our own. He makes known, in different parts of his book, as many as 117 fishes, although his object in this work was not to enumerate species, but only to present general results. Amongst the facts which he relates, many are still in doubt; however, from time to time, new observations teach us the justice of some of his assertions, even of those which seem the most hazardous. He says, for example, that a fish named *phycis* makes a nest like birds. For a long time the thing was treated as a fable; however, very recently, M. Olivi discovered that a fish named the goby (*Gobius niger*) has similar habits. The male, in the season of love, makes a hole in the sand, surrounds it with fucus, making a true nest, near which his mate waits, and which he never leaves till the eggs which have been deposited in it are hatched.

Aristotle, in the part where he speaks of the sensations, is particular in mentioning the animals which are deprived of any organ of sense, and those in which these organs present certain peculiarities. Thus, on vision, he speaks of the eye of the mole, which is hidden under the skin, but is similar in its configuration to that of other animals, and is furnished by a nerve, which is evidently of the fifth pair. On taste, he speaks of the fleshy palate of the carp. He treats of the hearing of fishes, and determines that water must serve as a medium for the transmission of sound. He shows that insects also enjoy the faculty of hearing, and even that they have the sense of smell, since they are driven away by certain odours, and attracted by others. In speaking of the voice, he distinguishes properly the true voice, which comes from the air driven out of the lungs, and the different noises which some animals make. He describes, on this occasion, the musical apparatus of grasshoppers and that of locusts, which consists of a very different mechanism. He speaks also of the voice of the parrot, and of the disposition of the tongue of frogs, which instead of being, as in most animals, free anteriorly and fixed behind, has its root attached to the anterior part of the jaws, and its point directed towards the palate.

In treating of waking and sleeping, Aristotle speaks of the hibernation of many animals, and of the sleep of fishes. He enters into details on this subject, which we should have much difficulty to verify at this day. But he was placed in very favourable circumstances for obtaining information on these animals. Greece abounds in gulfs and straits full of fish; the inhabitants of the coast would therefore devote themselves to fishing at an early period. It appears, it is true, from certain passages of Homer, that anciently this profession was despised; but this prejudice did not exist long. Considerable fisheries were established, and salt fish became an important article of commerce. It is on account of the riches which this kind of labour brought to the inhabitants of Byzantium, that their port received the name of the *Golden Horn*.

In the part where *generation* is in question, we find very extended and very just observations. Aristotle speaks here of the membranes in which many mollusca envelope their eggs, and describes them in the octopus and sepia. He exposes the metamorphoses of insects, which, before acquiring their last form, pass through the states of larva and of chrysalis. He knew also those incomplete metamorphoses in which the larva differs from the perfect insect only by the absence of wings, and undergoes only a single transformation. He speaks of insects which are found in the snow; and gives a multitude of most interesting details, whose accuracy is perfect. He admits, however, spontaneous generation in these animals, and thinks that when the constituent elements are found in certain proportions and in favourable circumstances, they may give origin to living beings; but it must be recollected that at this period such an error was almost inevitable: the microscope alone has been able to undeceive us. He speaks of the economy of bees, and says that some persons consider the *king* to be assuredly a female. He describes the kind of cell constructed for these privileged individuals, which shows that he had observed the interior of hives, although it is certain that he had not been able to make use of glass, which so much facilitates such an examination. He treats then of the domestic economy of wasps, of hornets, of mason-

bees, of drones: he describes the singular covering which envelopes the larva of the *Phryganea*, and speaks of the spiders which carry under the abdomen the capsule which contains their eggs. In treating of the animals of a superior order, he makes a very proper distinction between eggs with a hard shell, as those of crocodiles and of tortoises, and eggs with a soft envelope, as those of serpents. He says that serpents, which bring their young into the world alive, have also eggs, but that these eggs are hatched in their insides. He knew perfectly the development of the chick during incubation, describes it day by day, and speaks of the heart as the first point which appears, of the veins which then extend from the superior to the inferior parts of the body, and of the allantoid vesicle which soon encloses the whole egg. It must be remarked that all these observations were made with the eye alone, and that the slight errors which we find, arise entirely from Aristotle not having had the assistance of magnifying glasses. He remarks, in speaking of the eggs of fishes, that the allantoid membrane does not exist in them, nor in those of any animals which respire by branchiæ. He admits moreover in fishes, what he allows also to insects, spontaneous generation, and cites, in support of that opinion, facts which appear conclusive, such as the sudden appearance of an immense quantity of little fish, which the Greeks, on account of this supposed origin, named *aphia*, and to which, in the interior of France, a name is still given which refers to the same idea; they are there designated by the term *nonnats*, (*non nati.*) What he says of eels is certainly not exact; but we ourselves, notwithstanding the labours of Spallanzani, have yet much to learn with respect to the reproduction of these animals.

Aristotle examines the changes produced by age in animals and men, and, on this occasion, he gives excellent counsel to mothers. He passes then to the habits of animals, indicating the influence of their modes of life, of external circumstances, of climate, of seasons, and of the medium in which the different species live; and he mentions the food proper to each. His account of fishes is especially interesting, and would be extremely useful to us, if, when we wish to consult it, we were not frequently stopped, on account of his nomenclature not being well known. He treats of the influence of temperature on the migration of birds; speaks of those which migrate; of the periods of their removal, and of the order they follow in flying. He speaks also of the migrations of fishes; of the tunny, of the mackerel, of the pilchard; and states that legions of fishes enter into and pass out from the Black Sea. He follows them in their route across the Propontis and to the Archipelago. It appears that he had observed them on the coasts of Thrace, and especially at Byzantium. He mentions that the same fish at different periods receives different names; that, for example, the fish which was known in the Black Sea under the name of *cordylus*, took at spring the name of *pelamis*, and at length that of *thynnus* when it arrived in the Archipelago. He treats of fishes which do not show themselves in the winter; and also of other animals which appear at certain periods of the year, as the *bobac*, or Polish marmot. He speaks of the diseases of fishes, and he appears to be much better informed on this subject than we. In describing the different kinds of industry of animals, he makes known the means by which the frog-fish (*Lophius piscatorius*) allures small fish to devour them; he speaks of the shock which the torpedo gives when it is taken in the hand; of the manner in which the sepia hides itself from the pursuit of its enemies, by discolouring the water with its ink. He pursues this investigation in the class of insects, and dwells upon some of them, particularly on the spiders; then, passing to the birds, he describes the different methods in which they construct their nests; mentions that there are some species which do not make any; and, lastly, gives the history of the cuckoo, which lays its eggs in another's nest.

It may be conceived, from this analysis, how rich and abundant in information is the History of Animals. There is, nevertheless, in this book a fault which detracts much from its utility to us. Aristotle, like all ancient naturalists, seems to have thought that the language which he spoke must be eternal, and

that the words would never change; and he contents himself, in general, with merely naming the species. The only descriptions, properly so called, which he has given, are of the elephant, the camel, the crocodile, and the cameleon. Some other animals, it is true, are indicated by characteristic traits, and could not be mistaken; but more frequently we are reduced to conjectures founded on some circumstances in the history of the animal, or upon properties which the author assigns to it; we collect the different passages which relate to it; we compare them with each other, and with those which we find in contemporary authors; we even connect with them statements borrowed from authors of a posterior date; but, in this latter case, much circumspection is required, since the signification of words is liable to vary with the times. We may observe, indeed, that the names were changed between the time of Aristotle and that of the Athenæum, and much more have they been changed till our time. However, the zoological nomenclature of the modern Greeks may often be made serviceable in discovering the animals of the ancients.

Scaliger has given a good edition of the History of Animals; but the best of all is that published, in 1811, by M. Schneider. The translation of Theodore Gaza is often quoted, but it is very inexact. This translator was a Greek who went to Italy after the taking of Constantinople by the Turks; he had a bad knowledge of Latin, so that every time he found in Pliny a passage borrowed from Aristotle, he transcribed it literally. It appears that he had but a bad copy of the Greek text.

There is a French translation by M. Camus; the text is nearly that of Scaliger. The translation is as good as one could expect from a man who was not a naturalist; but the volume of notes which is subjoined only obscures the subject.

The other books of Aristotle relative to natural history are much less clear than that of which we have been speaking. They are more mingled with discussions on technical terms; the Greek tongue is adapted to this sort of debate,—an inconvenience which is common to all languages which are faithful to etymology. Every word, indeed, offering, as it were, an abbreviated definition of the thing, necessarily carries with it the impress of those false notions which were entertained when it was formed. Thence comes the necessity of defining every term; thus we see Greek writers explain, distinguish, and subdivide their words *ad infinitum*. They pushed the thing to an extreme; and Aristotle himself, as we have remarked, falls sometimes into this error. However, those of his works which have this reproach, appear to have been much anterior to his History of Animals, and were probably only a sort of preparatory exercise. This applies particularly to the *wonderful facts*, which are nothing but a collection of notes disposed without order, but which possess much interest from containing different extracts from lost works. There is a good edition of it by Beckmann.

A book upon plants has been attributed to Aristotle; but it appears that this work is apocryphal.

Lecture VIII.—Most of the great conquests of which history speaks, have been wrought by the arms of demi-savage hordes, who, precipitating themselves upon civilized nations, have brought ignorance and barbarism in their train. The expedition of the Greeks under Alexander has an entirely different character: in it we see a people, already far advanced in civilization, enlightening every place to which they penetrate, and at the same time causing a reflux to their own country of every thing which others offer of the beautiful or useful. It was indeed during the progress of this conquest that Greece was enriched with many new animals,—that it received elephants, which were shortly used in the armies of many of the princes of the west,—peacocks, whose brilliant plumage excited so much admiration, that they were first exhibited for gain,—and, lastly, parrots, of which the species then brought to Greece still preserves, amongst naturalists, a name which refers to the period of its introduction: it is the *psittacus Alexandri*, the green parroquet, with the pointed tail and scarlet collar.

However, if the Greeks had not been led by an enlightened prince, their expedition would have been no more useful to the progress of science than the thousands which had preceded. But Alexander, in accordance with the advice of Aristotle, was surrounded by philosophers especially charged to observe all the productions of the countries through which the armies past; and thus, instead of the fabulous tales of Ctesias, authentic accounts were given by qualified men, who were placed in the most favourable circumstances to see and study every thing. Amongst those who were members of this mission, we must particularly distinguish Callisthenes, who, before his departure, was already known by many scientific works, especially by a book on plants, and by an anatomical description of the interior of the eye. The result of his observations is not known to us, owing to his tragical end; however, it is probable that his researches have not been entirely lost to science, and that, to the moment of his disgrace, he had kept up a constant correspondence with Aristotle, who was at once his master and his parent.

The scientific explorations were not confined to the provinces through which Alexander passed; and when the neighbouring countries were visited by his lieutenants, some *savans* were almost always added to the expedition. Thus, when after having descended the Indus, the king of Macedon ordered Nearchus to pursue his route by sea, he associated with him the philosopher Onesicritus. The fleet, traversing a sea which the Greeks then for the first time saw, sailed towards the west to Harmozia, a port situated near the mouth of the Persian Gulf. In her course she had frequent communications with the people who lived on the coasts, and the narrative of the voyage contains many descriptions of plants and animals, which were observed whilst touching at different places. There is a notice, for instance, of the tree which bears cotton, of the royal or striped tiger, of the whale, the jaws of which were used by some of the natives in the construction of their houses.

Alexander died at thirty-two years old, in the year before Christ 323. His empire, which extended from the Adriatic Sea to the Indus, was soon dismembered, and his lieutenants contended for the fragments. For some time every thing was in confusion; but Perdiccas having been killed, and afterwards Antigonus and his son Demetrius Poliorcetes having been defeated at the battle of Ipsus, three kingdoms were established, which promised to be durable. Cassander reigned in Macedon, Seleucus in Syria and the neighbouring countries, Ptolemy in Egypt. Of these princes, the first alone seems not to have loved the sciences and letters: he governed Greece, tyrannized over Athens, and diminished the taste for study. But it was not the same with the others. Not only did they protect letters, but they even cultivated them with some success. Ptolemy, who had been a captain under Alexander, and who moreover, it is said, was his natural brother, wrote a history of the conquest, and it was upon this narrative that Arrian founded his work.

Ptolemy and Seleucus both applied themselves to the formation of a library on the model of that of Aristotle, and perhaps after the advice which he had given them at an earlier period. Before this philosopher, some individuals had collected books as a means of amusement, but no one had thought of it as an instrument in the study of the sciences. He was the first who formed a collection of books for consultation when needed. His library, which seems to have been very extensive, was afterwards united to that of Alexandria by Ptolemy, who bought it of Neleus.

The empire of Seleucus was the largest; but it was soon broken up into the kingdoms of Pergamus, Cappadocia, Pontus, Bithynia, and Bactriana. The kingdom of the Ptolemys, on the other hand, was the smallest, but it was the most tranquil, and it soon came to flourish by the same means as led to the prosperity of Egypt under the ancient dynasties. He extended it by conquests in the south, and it was incontestibly the richest, the most industrious, and for a long time the best governed of all those which had been under the empire of Alexander.

Ptolemy established his library at Alexandria, a city which was in its infancy, but which already spoke of future grandeur. He collected there a great number of learned men, to whom he assigned salaries and dwellings near the library. Thus each of them, free from all personal cares, could devote himself entirely, and without distraction, to study. This institution, which received the name of *Museum*, was from its birth in the most favourable circumstances which any learned society could desire. Besides the illustrious protection of a prince, and the use of a vast library, it was in a geographical position whose advantages can scarcely be appreciated. Alexandria had become in a few years the general commercial mart for the whole circumference of the Mediterranean, of Central Africa, of Arabia, of Persia, and of India : thus there came from all sides the productions of foreign countries, and the narratives of travellers. The labours of the members of the Museum were then crowned with the most happy success. But it must be remarked here, that this was a continuation of Greek science and not of Egyptian learning ; for the philosophers whom Ptolemy collected, brought with them knowledge of a very superior order to that which they found in this country, where external oppression and civil wars had long since extinguished the lights of science.

The second of the Lagides, Ptolemy Philadelphus, who commenced to reign in the year 285 before Christ, was no less favourable to learning than his father. He had been instructed by a disciple of Aristotle, Strato, surnamed *Physicus*, on account of his passion for natural history; and he himself imbibed much taste for this science. Feeble by birth, he sought in study a compensation for the pleasures of which his constitution had deprived him ; but, even in this kind of amusement, he exhibited a regal magnificence. Strato had written a book on true and fabulous animals. Ptolemy himself cultivated zoology, and for that purpose founded a menagerie, the first which had existed, and without doubt also the most splendid which ever was seen. Not only had he at his command immense riches, but he was so situated as to be able to assemble the productions of all the known world. The commerce which Egypt maintained with the interior of Africa gave him facility in procuring all the animals of that country which came by land or descended the Nile ; those of Europe and Asia Minor arrived by the Mediterranean; those of India by the Red Sea.

To obtain an idea of the riches of this kind which Alexandria contained, it would be sufficient to read an account of a fête which was celebrated by the King of Egypt in honour of his father. As Ptolemy Soter had travelled in India, it was wished to allude to his expedition in representing, in the solemnity, the triumph of Bacchus. The train of the god presented a collection of rare animals, such as all the sovereigns of Europe, if they united their efforts, could not at this day assemble. There were cars drawn by elephants, and others by stags, bubals, ostriches, and oryxes. There were camels laden with aromatics and with all the most precious products of the east, Ethiopian sheep, white stags of India, leopards, panthers, ounces, white bears, and twenty-four lions of the largest size. We were for a long time astonished to hear of white bears in this procession, not knowing of any except in the polar seas, and we sought to explain how Ptolemy had been able to obtain them from these distant parts ; but, some time since, M. Ruppel informed us that white bears exist in Lebanon, and no doubt those of which we speak came from these mountains.

Such a collection could not but be very useful to those who were engaged in natural history. A menagerie, moreover, was well placed in Egypt, where it had been the custom so long to rear animals in the temples, and observe their habits, and embalm them after death. And Alexandria possessed good anatomists and zoologists as long as the peripatetic philosophy prevailed. But, for the present, we must leave the *savans* of the museum, and return to Athens to follow the history of philosophy.

Uses of the Vesicular Appendages of the Janthina.—The Janthina is a pelagic molluscum, and moves by means of two little lateral expansions, but which, though they serve for locomotion, are not sufficient to keep the animal suspended in the water. Nature has, however, supplied this want by a contrivance of which we have no other example amongst the mollusca, though it often occurs in the acalepha, animals of an inferior order. This contrivance consists of a dense group of little air-vesicles of a sub-cartilaginous and diaphanous substance, attached to the posterior part of the foot, and by means of which the animal constantly floats upon the surface of the water.

This cluster of vesicles has, moreover, another use, now first made known ; it serves also to contain the ova of the molluscum, of which we have counted as many as one hundred and eighty, suspended in a line, on the inferior surface of one of the vesicles. Sir Everard Home, then, is mistaken when he says that the ova of the Janthina are fixed around the shell by a glairy substance.

Many learned naturalists have supposed this mass of hydrostatic vesicles to be the rudiment of an operculum. Certainly this organ is absent in the Janthina, and it may be allowed that the vesicular appendages supply its place by filling up the opening of the shell when the animal is retracted; but these vesicles do not adhere in the same manner, nor have the general situation of the operculum, since instead of being above the posterior part of the foot, they are below it.—RANG, *Manuel des Mollusques*, p. 25.

Maturation of Fruit.—At a late Meeting of the Academy of Sciences, M. Couverchel read a paper on this subject. After giving an analysis of the investigations that had already been made, he remarked in what particulars they agree with his own, and then exposed the theory to which his numerous experiments have led him. According to the author, two periods are to be distinguished in the history of the fruit. The first comprehends its development and the formation of the principles which enter into its composition. In this first period the influence of the plant upon the fruit is indispensable. The second comprehends the ripening properly so called, and is effected by the reaction of the constituent principles of the fruit. In this second period, the acids, favoured by heat, transform the gelatine into saccharine matter. The phenomena are in this case purely chemical; they are independent of vegetable life, and, in fact, most kinds of fruit will ripen after being detached from the tree. The author finds this theory so much the more probable that it agrees with another series of experiments in which he has been engaged, respecting the transformation of fecula into sugar. He remarked the resemblance which these two operations present; and, submitting to the examination of the Academy two new products which he has obtained in treating fecula with vegetable acids, and only varying the proportion, he gave to the first, which is allied to vegetable jelly, the name of *normal gum*, on account of its simplicity, and the property which it has of furnishing only oxalic acid when treated by nitric acid. The other, which possesses all the properties of grape sugar, may easily be confounded with that substance. The author, to prove the resemblance which he pointed out as existing between the two operations, maturation and the conversion of fecula into sugar, remarked that the gelatine, in both cases, always precedes the saccharine matter, and that it is the first of these substances that produces ripening. M. Couverchel's experiments on the juices of fruits, and in particular on the juice of the grape, appear very remarkable; and show the possibility of improving wines of inferior quality, otherwise than by the addition of substances foreign to their composition, and deleterious in respect to the health. He then described some of the methods which he had sought for the preservation of fruit, and pointed out the circumstances to be avoided in order to attain this important object.

Essential Characters of the Roots and Stems of Plants.—In whatever medium they are developed, *roots* are always deprived of vital knots symmetrically

disposed at their surface, and consequently of foliaceous appendages. The multiplication of their branches is purely accidental. *Stems*, on the contrary, are always provided with vital knots on their surface, symmetrically arranged, or accompanied by a foliaceous appendage,—an organ sometimes reduced to a rudimentary state, or altogether wanting. Potatoes, the bulbs of the *Solanum tuberosum*, are not roots, as generally supposed, but stems expanded at their extremities, and with the interior converted into feculent cells mixed with fibres. And the same phenomenon is observed in the bulbs of the Jerusalem artichoke, (*Helianthus tuberosus.*) But the Batatas, (*Convolvulus Batatas,*) is a true tuberculous root.—TURPIN *in Mem. du Mus. d'Hist. Nat. An. X. Cah. I.*

Marcel de Serres' Zoological Periods.—Three principal causes, says M. Marcel de Serres,* the lowering of the temperature, the retreat of seas, and inundations, have modified the surface of the globe, and destroyed a certain number of beings, which in the beginning inhabited that surface. The most powerful of these causes, the diminution of temperature, appears to have acted the first; and its effects have also been most extensive, since the continents were thereby solidified; after which certain animals and plants must have ceased to exist as the temperature of the earth decreased. The second, or the retreat of seas, has also left numerous traces of its action. Regular in its effects, it has not, like inundations, produced deposits out of the series, which do not exhibit that uniformity and constancy found in deposits which were left by the seas as they retired from the surface of our continents.

The other causes which may have modified the crust of the globe, have been very limited in their effects, and have by no means exercised such a powerful influence on living beings as those of which we have spoken.

When we observe the fossil remains of organized bodies, it is evident to us that they have been deposited in the earth by successive generations, the most simply organized being buried in the most ancient beds, and the most complicated in the most recent. We remark also that the remains of the same order, or of the same formation, and more especially of the same stratum, have a particular resemblance to each other, and a general difference from those of superior or inferior deposits, or of other formations; and this difference becomes greater as the deposits are more distinct, and farther separated in a vertical direction. Thus, the organized bodies which have successively inhabited the earth, are, with some exceptions, the more different from those now living, as their remains are found inclosed in deeper strata, or as they have lived in times the more remote from the present epoch.

Organized beings having succeeded each other according to certain laws, the most evident of which is their having appeared more slowly in proportion as their organization was more complicated, are therefore as varied as the nature of the strata which contain them; whence, periods of animalization and of vegetation may be distinguished in the fossiliferous formations.

In studying fossil animals in the order of their creation or of their distribution, which indicates their successive formation, three great periods seem to be distinguishable. The first, or the most ancient, comprizes the space of time which elapsed from the precipitation of the transition series, (or *inferior secondary*, according to the language of M. de Serres,) to the deposition of the middle secondary formations. In this period, avertebral animals are singularly in excess over the vertebrated, which are reduced to a few traces of fishes; the aquatic species far exceed in number the terrestrial species; and some insects are the only animals with aerial respiration which have appeared at this epoch. The second period contains the entire series of secondary formations, (middle and superior;) it presents a greater number of vertebrata, but principally of aquatic reptiles, with some ter-

* Géognosie des Terrains tertiaires, &c.

restrial species. Besides these animals with aerial respiration and cold blood, one genus of terrestrial mammalia and many insects, are the only beings of this period which had need of dry land. The third period, connected in some degree with the present epoch, abounds in organic remains; the terrestrial mammifera, with the mollusca and the insects, which live on the surface of the land are more numerous, compared with the species which have lived in the waters, as their remains are found in the more recent strata. In inferior numbers in the middle formation of the tertiary series, where they only begin to appear, the terrestrial mammifera afterwards predominated over the marine species of the same class, and at last almost exclusively composed the population which perished at the time of the dispersion of the alluvial formations which cover and terminate the series of tertiary deposits.

Analysis of Phonolitic Rocks.—M. Gmelin divides volcanic rocks into two classes, the *basaltic* and the *trachytic*, between which the *phonolitic* rocks are intermediate. The phonolites are composed of feldspar and a zeolitic substance, which is most commonly mesotype. These two minerals may easily be separated from each other, by treating the rock, reduced to an impalpable powder, with muriatic acid of medium strength for twenty-four hours. The zeolite is decomposed, and the feldspar is unchanged. We separate from the latter the silica with which it is mixed, by boiling it in a solution of carbonate of potass, and the analysis of the residue may then be made by dissolving it with carbonate of baryta.

By this process M. Gmelin has arrived at the following results:

1. *Phonolite of Hohenkräken*, in the Hegau; of a clear brownish gray, specific gravity 2.504. The zeolitic portion contains in 100 parts, silex 43.44; alum 22.89; soda 13.67; potass 5.45; lime 2.44; protoxide of iron 2.66; oxide of manganese 1.19; sulphuric acid 0.22; water 5.77. The feldspathic part is composed of silex 66.55; alum 15.86; soda and potass 9.44; lime 1.27; protoxide of iron 4.63; oxide of manganese 0.98. The specimen analyzed contains 55 parts of zeolite.

2. *Phonolite of Pferdekuppe*, in the Rhöngebirge; of a greenish-gray, decomposed at the surface, sp. gr. 2.605. This analysis accords in a remarkable manner with that of the phonolite of Hegau. It gives 13.7 of zeolite.

3. *Phonolite of Abstrode*, in the Rhöngebirge; similar to the preceding, and decomposed at the surface to the depth of three lines. The unaltered part contains 15.8 of zeolite; the altered portion contains 0.42 of matter soluble in acids.

The preceding analyses show, in the most decisive manner, that the phonolites of Hegau and of Rhöngebirge are mixtures of feldspar and mesotype. The former predominates in the rocks of Rhöngebirge; those of Hegau, on the other hand, contain a greater proportion of mesotype. The part upon which acids act, approaches in its composition sometimes to natrolite, at others to mesolite or mesoline; but it always contains a less proportion of water. The composition of the other portion agrees precisely with that of feldspar, and may be represented by the formula,

$$\left.\begin{matrix}\mathrm{N}\\ \mathrm{K}\end{matrix}\right\} \mathrm{S}^3 + 3\,\mathrm{A}\,\mathrm{S}^3.$$

The phonolites contain a greater quantity of zeolite in proportion as they are lighter, and as they contain more alum. When the rocks are changed by the action of the air, they are transformed into almost pure feldspar, and the zeolitic portion is decomposed. We may say that the phonolites are characterized by the abundance of potass and soda, as the basalts are by the great proportion of protoxide of iron and of magnesia which they contain.

The phonolitic formations are known to be extremely fertile, and particularly adapted to the cultivation of the vine. It is probable that this may arise from these rocks imparting to the soil a great quantity of alkali during decomposition. —*Naturwissench. Abhandlungen*, Vol. II. p. 133.

On the Chromophorous Globules of the Cephalopodous Mollusca.—The entire surface of the cephalopodous mollusca, and particularly the superior and lateral portions of the body of these animals, are speckled by a great number of little follicles, or globules, or little coloured circles, about the size of a grain of sand, but varying in magnitude according to the species, and their degree of development. Even the iris of these mollusca is richly ornamented with coloured follicles, which add an additional splendour to its brilliant metallic lustre.

Each of these spots is of a single colour. The principal tints which are found in the species inhabiting the Mediterranean, are yellow, red, brown, indigo, and sky-blue, all varying in their degree of intensity. And the follicles may be divided into as many orders as there are colours.

The number of the orders of follicles, which is found in each species, varies; in some they all exist; in others we do not find so many; but, except in the *Sepia Rondeletii*, we never see less than two. They are distributed over the skin of the animal, at equal distances; and, although the number of follicles of each colour be different, they are so combined that each part of the body of the animal is provided with them in an admirable proportion.

The seat of these coloured follicles is the *outis*, and especially the *rete mucosum*. They are accordingly covered by the epidermis, which is smooth and transparent; they have no visible connection with any vascular system, nor with the part of the body which is immediately below them. M. San Giovanni, who first accurately described* these spots, considers them to be a system of organs, which he has named the *chromophorous* or *coloriferous* organs. The colour which they possess is not produced by any circulating or encysted fluid, but is inherent in the tissue.

But what is most remarkable in these spots is the alternate contraction and expansion which they exhibit on very slight irritation, even long after the death of the animal.

During life, when the animal is in a state of repose, the vesicles are contracted and are not visible. When it is excited, by being touched with the hand, or otherwise irritated, the coloured vesicles show themselves, and are instantly in motion, appearing and disappearing with the velocity of lightning; sometimes they are like spots on different parts of the body, and sometimes like waves, which rapidly move across its surface. M. San Giovanni states that each of these vesicles is composed of a skin, having the structure of felt, and is provided with a circular aperture, which can open and shut probably by means of a circular muscle, and which enables us to see to the bottom. "And," he continues, "their expansive and contractive power, during life, is owing to their particular structure, which is subjected to the influence of the nervous system, with which they are connected by means of delicate filaments, scarcely perceivable with the aid of the microscope; for every motion in them ceases when the skin is separated from the body." Subsequently, however, to the publication of San Giovanni's first memoir, more favourable opportunities for observation have occurred to our friend Dr. Coldstream of Leith, who, in November 1826, read the result of his investigations on the subject before the Royal Medical Society of Edinburgh. The conclusions at which the author arrived, agreed in the main with those of the other observers, with the important exception, that he found the spots to possess motion even in pieces of the mucous coat which had been removed from the animal. Hence their dependence upon the nervous system was disproved, nor could Dr. Coldstream, by the most careful microscopic examination, discover the slight-

* This structure seems to have been first observed by Carus, in 1821. (Vide Act. Acad. Nat. Cur. Vol. XII. p. 320.) In 1822, Blainville alluded to it in his Anat. Comp.; but it was reserved for Dr. G. San Giovanni of Naples to investigate minutely this peculiar system, which he described in 1824, in the Giornale Enciel. di Napoli. A second memoir by the same observer has been recently published in the Ann. des Sciences Naturelles, XVI. 315, the results of which we give in the text.—Ed.

est trace of any nervous filaments in connection with the spots. And the author further remarks, that though viewing the phenomenon under circumstances more advantageous than those which occurred to San Giovanni, namely, when separated from the body of the animal, and under the microscope, with a strong reflected light passed through the mucous membrane while the spots were in action, he could not succeed in discovering any opening in them, even during the greatest dilatations; indeed, the spots seemed almost as opaque when dilated as when contracted.

"That I might ascertain," says Dr. Coldstream, in his unpublished memoir, "whether or not the motions of the spots were *now* (after apparent death had taken place) carried on by the influence of external agents, independently of any nervous power emanating from the animal itself, I cut, from a part of the mantle where the contractions and dilatations were very strong, a piece of the membrane or layer containing the spots, about 2-10ths of an inch square; this I separated completely from the animal, and placed it in a watch-glass immersed in sea-water in another vessel. To my astonishment, I saw that the spots in the separated portion continued in as lively motion as when connected with the animal. No change, either in the velocities or extent of their motions, could be perceived. Some spots just on the edges of the separated piece, seemed to have been half cut through by the scissors with which I removed it; such did not contract; but all the others in the piece moved in the very same manner as before.

"I now removed the watch-glass, containing the separated portion, to the stage of a microscope, and examined the spots with powers of 100 and 150. This, however, gave me no advantage. I saw nothing more than I had previously observed with the naked eye. San Giovanni has compared the appearance of the structure of the spots to that of felt; but I could not satisfy myself that this was the case in those examined, although I passed through the membrane a very strong light. I saw that the spots were very thin bodies, attached to the mucous coat of the integument; that they had no connection with the epidermis; that, in dilating, their edges passed over, or under each other indiscriminately; that their edges were extremely sharp and well-defined; that they never were increased in thickness during dilatation; and that no vessels carrying coloured fluids entered them. I could not discover, indeed, any thing like either vessels or nervous filaments connected with any part of the integument of the animal, and I feel assured, that from the great size of some of the spots which I had under the microscope, I must have seen at least a few vessels carrying dark-coloured fluids entering the mucous coat, had it been from such a source that the increase in size of the spots was derived.

"The separated piece of the mucous coat, with the palpitating spots, remained under my microscope, exposed to a strong reflected light, for three quarters of an hour, during which time I could perceive no alteration in its appearance, or the strange phenomena it presented. While the motions of the spots were very brisk, I suddenly removed it to a dark place, where it remained fifteen minutes. On bringing it again to the light, I found that all motion had ceased; most of the spots were in a state of contraction; but, on allowing it to remain for three minutes exposed to a moderately strong light, the dilatations again commenced, and were carried on unceasingly for a very considerable time. I repeated these experiments with other pieces of the spotted membrane, and always with similar results. At the end of nearly two hours from the time when some of them were removed from the animal, the spots were dilating; but, in the course of a few minutes afterwards, motion finally ceased."

In his second memoir, recently published, (Ann. des Sciences Nat. XVI. 315.), M. San Giovanni shows that every species of cephalopoda, besides its peculiar zoological characters, is distinguishable from all the others, as well by the different orders of chromophorous globules, as by the different intensity of the co-

lours of these globules. And he gives the following instances from species inhabiting the Mediterranean Sea, two of which are now first described.

1. *Loligo vulgaris* has three orders of chromophorous organs, yellow, roscred, and brown. Those of the first order are less numerous and smaller than the others; those of the second are more numerous and of greater size; the third, or those of brown colour, are the largest of all, in greater numbers than the first, but less numerous than the second. On the superior part of the head and body small globules of all the orders of colours exist. On the confines of the lateral parts, and on the inferior surface, yellow and red are alone seen.

2. *Loligo sagittata* has four orders of chromophorous globules, saffron, roscred, deep blue, and light blue. The superior part of the head, of the sac, and the arms, are ornamented with deep blue and light blue in different proportions; the lateral and inferior parts of the body and of the wings are of a saffron and rose colour; and the arms present all the four colours.

3. *Sepiola Rondeletii* is the only example, amongst all the cephalopoda observed by our author, in which there exists a single order of chromophorous organs over the whole of the body. They are all brown approaching to black.

4. *Sepia officinalis* has two orders of coloured globules, ochre-colour and deep chestnut, which are in equal proportions. Those of deep chestnut-colour are so accumulated on the skin which covers the shell that the ochre-coloured globules cannot be perceived, and they give almost a black colour to the surface; but these two orders become separately visible on the fringe, the head, and the arms, where they are least numerous.

5. *Octopus moschatus*, like all the species of this genus examined by M. San Giovanni, has only two orders of globules, saffron and deep chestnut-colour. The latter predominate on the superior surface, whilst the former prevail on the inferior surface.

6. *Octopus leucoderma*, San Giov., has two orders of chromophorous organs, light chesnut and ochre-colour, the former larger than the latter. The sclerotic is also covered with these coloured globules.

7. *Octopus macropodus*, San Giov., has three orders of coloured organs, saffron, deep chestnut, and deep blue approaching to black. The iris of this new species is distinguished not only by blue or ultramarine colour, but also by deep chestnut-coloured globules, which are found in no other part of the body, and which produce an admirable contrast with the elegant colour of the membrane on which they move.

8. *Octopus vulgaris* is furnished with four orders of globules, saffron, red (lees of wine,) blackish, and bluish. The superior part of the body is covered with pale-red, blackish, and saffron-coloured globules. On the head the blackish globules are in great numbers, and the saffron globules abound only in the circumference of the eye. The iris presents red and bluish globules.

9. *Argonauta Argo* unites all the orders of globules which are found in the other cephalopoda; which gives a great variety of colours to the surface, varying with every change of light.

Chronological Table of the most important known encroachments made by the Sea, since the Eighth Century; by M. Adrien Balbi.

A. D. 800. About this period, the sea carried off a great part of the soil of the island of Heligoland, situated between the mouths of the Weser and the Elbe.

800—900. During the course of this century, many tempests made a considerable change in the coast of Brittany; vallies and villages were swallowed up.

800—950. Violent storms agitated the lakes of Venice, and destroyed the isles of Ammiano and Constanziaco, mentioned in the ancient chronicles.

1044—1309. Terrible irruptions of the Baltic Sea on the coasts of Pomerania, made great ravages, and gave rise to the popular tales of the submersion of the pretended town of Vineta, whose existence is chimerical, notwithstanding the imposing authority of Kant and other learned men.

1106. Old Malamocco, then a very considerable city on the lakes of Venice, was swallowed up by the sea.

1218. A great inundation formed the gulf of Jahde, so named from the little river which watered the fertile country destroyed by this catastrophe.

1219, 1220, 1221, 1246, and 1251. Terrible hurricanes separated from the continent the present isle of Wieringen, and prepared the rupture of the isthmus which united northern Holland to the county of Staveren, in modern Friesland.

1277, 1278, 1280, 1287. Inundations overwhelmed the fertile canton of Reiderland, destroyed the city of Torum, 50 towns, villages, and monasteries, and formed the Dollart; the Tiam and the Eche, which watered this little country, disappeared.

1282. Violent storms burst the isthmus which joined Northern Holland to Friesland, and formed the Zuyderzee.

1240. An irruption of the sea changed considerably the west coast of Schleswig; many fertile districts were engulphed, and the arm of the sea which separates the isle of Nordstrand from the continent was much enlarged.

1300, 1500, 1649. Violent storms raised three-fourths of the island of Heligoland.

1300. In this year, according to Fortis, the town of Ciparum, in Istria, was destroyed by the sea.

1303. According to Kant, the sea raised a great part of the island of Rugen, and swallowed up many villages on the coasts of Pomerania.

1337. An inundation carried away 14 villages in the island of Kadzand, in Zealand.

1421. An inundation covered the Bergseweld, destroyed 22 villages, and formed the Biesbosch, which extends from Gertruydenberg to the island of Dordrecht.

1475. The sea carried away a considerable tract of land situated at the mouth of the Humber; many villages were destroyed.

1510. The Baltic Sea forced the opening at Frisch-Haff, near Pillau, about 3600 yards broad, and 12 to 15 fathoms deep.

1530—1532. The sea engulphed the town of Kortgene in the island of North Beveland, in Zealand. In the latter year, it also raised the E. part of the isle of S. Beveland, with many villages, and the towns of Borselen and Remerswalde.

1570. A violent tempest carried off half of the village of Scheveningen, N.E. of the Haguc.

1625. The sea detached a part of the peninsula of Dars, in Pomerania, and formed the isle of Zingst, N. of Barth.

1634. An irruption of the sea submerged the whole island of Nordstrand: 1338 houses, churches, and towns were destroyed; 6408 persons and 50,000 head of cattle perished. There only remained of this island, previously so fertile and flourishing, three small islets named Pelworm, Nordstrand, and Lütje-Moor.

1703—1746. In this period, the sea raised the island of Kadzand more than 100 fathoms from its dikes.

1726. A violent tempest changed the *saline* of Arraya, in the province of Cumana, part of Colombia, into a gulf of many leagues in width.

1770—1785. Storms and currents hollowed out a canal between the high and low parts of the island of Heligoland, and transformed this island, so extensive before the 8th century, into two little isles.

1784. A violent tempest formed, according to M. Hoff, the lake of Aboukir, in Lower Egypt.

1791—1793. New erruptions of the sea destroyed the dikes and carried away other parts of the island of Nordstrand, already so much reduced.

1803. The sea carried away the ruins of the Priory of Crail, in Scotland.

Bull. des Sci. Nat. Jan. 1830.

NATURAL-PHILOSOPHICAL COLLECTIONS.

On the Chemical Composition of Cheese. By M. R. BRANDES.—It results from M. Brandes' researches on the chemical composition of cheese, made in the farm-houses, that in 4 oz. there are as follows :—

1.	A gelatinous animal substance, or caseous matter somewhat modified by aposepedine (caseous oxide,) common salt, and phosphate of lime, - - - - - - -	10 grains.
2.	Aposepedine, - - - - - - -	65
3.	Aposepedine combined with ammonia ; an animal matter soluble in water and precipitable by the tincture of galls ; acetate of ammonia ; muriate of soda, and traces of phosphate and sulphate of soda, - - - - - - - -	379
4.	Sebacic acid and sebate of ammonia, - - - -	165
5.	Sebacic acid and oleic acid combined in part with ammonia, -	15
6.	Aposepedine with ammonia and a gelatinous animal matter, -	30
7.	More or less altered caseous matter, with sebate of lime, and traces of phosphate of lime, - - - - - -	165

The other parts contained in the cheese consist of water and seasoning, such as cummin-seed.

The principal mass of a well prepared cheese, then, consists of aposepedine combined with ammonia, of free aposepedine, of sebacic acid and sebate of ammonia, of a gelatinous animal matter, and of caseous matter more or less modified. In the caseous fermentation there is formed, besides aposepedine and the sebacic and oleic acids, a great quantity of ammonia, which combines with those acids, but which is partly dissipated when the mass is dried or heated. It is almost beyond doubt that aposepedine is formed at the expense of caseous matter ; but we have less clear notions of the formation of sebacic acid, whose proportion is very great. M. Brandes remarks, that the composition of decayed and poisonous cheese has no appreciable difference from that of wholesome cheese ; that sebacic acid cannot be considered as the poisonous principle, and that it consequently remains a subject for investigation to ascertain the difference between the two.---*Archiv. der Apotheken-Vereins.* xxix. 71.

Extract from a Letter of Professor Harding to Dr. Tiarks, dated Gottingen, December 19, 1829. *Read before the Astronom. Soc.*—" I observed the observation of Aldebaran on the 9th December, and the sky being perfectly clear, I obtained the moments of immersion and emersion with extreme precision. The first creeping out of the star at the emersion was easily perceived, by the contrast of its red light with the white light of the moon's limb ; and I think that the observation of the emersion is as accurate as that of the immersion. I devoted all my attention to the observation, with a view to the well-known phenomenon of the star's remaining visible some seconds on the moon's disc, which has been repeatedly observed in this star, and which I have myself seen several times. I remained at the immersion, as well as at the emersion, 10 seconds before the telescope without turning my eye off, but nothing of the kind was seen."---*Ann. of Phil. June* 1830.

Supposed New Vegeto-Alkali—Chinioïdia.—MM. Henry, jun. and Delondre have made numerous experiments to determine whether such an alkali really exists as that which Serturner has named Chinioïdia, and they have arrived at the following conclusions :---

1st. That there remains little doubt as to the non-existence of chinoïdia, and that it appears demonstrated that it is only a modification of quina and cinchonia

combined and rendered uncrystallizable by a peculiar yellow matter. These modifications cease, when after a long time and much care it is either separated or destroyed and crystallization takes place.

2nd. That the yellow resinous matter which accompanies quina more than cinchonia, appears to change its properties much; this yellow matter the authors succeeded in destroying, but without being able to collect it separately in a perfect state. It appears to differ from the yellow colouring of the bark, which is fixed by alumina, oxide of lead, and of tin.

3d. That this yellow matter especially influences the crystallizations.

4th. That the most certain method of clearing the mother waters from it, are the addition of turpentine, repeated precipitation and solutions in the acids, and concentration by cold.

The experiments were made by MM. Henry and Delondre, and always with the same results; they operated upon the mother waters remaining after the treatment about two hundred thousand pounds of yellow bark, and they always separated from this suspected matter the portion of quina and cinchonia, the crystallization of which it had prevented.—*Journal de Pharmacie*, March 1830.

Aurora Borealis.—In the evening of the 19th, soon after sunset, as bright a light appeared in the horizon about the magnetic north as the crepuscule immediately above the sun; and as the twilight withdrew, the aurora increased in brightness. At 9 P.M. it showed a steady flame colour, and was comprised between the N.W. and N. by E. points of the horizon, and about nine or ten degrees in altitude.

At 11 o'clock a vertical line of light, whose bearing was N. by E. $\frac{3}{4}$ E. emanated from the aurora, and in a few minutes afterwards other corruscations emanated from it between N.W. and N., but they often dissappeared, and rose again to an altitude exceeding that of ε Cassiopeiæ. At a quarter before 12, seven columns of light of various widths appeared at once, and continued several minutes; the wind blowing fresh from the westward seemed to give them a slight inclination from a perpendicular towards the east, and they did not finally disappear till between one and two A.M. In the course of the evening several bright meteors descended from over the aurora, and in a few hours afterwards a heavy gale came on from the S.W. and continued nearly four days. This meteoric phenomenon was also seen in Scotland, but from the interposition of clouds it did not display any vertical columns there, only faint corruscations in the horizon. Whatever gaseous quality an aurora borealis may possess, whether hydrogenous, electric, or magnetic, or a mixture of any of these, here (London ?) it is very generally, if not the cause, a prognostic of a strong gale of wind from some quarter.—*Ann. of Phil.* June 1830.

On the Difference in the Heiyht of Spring Tides.—The first, second, and third tides after the new moon on the 24th of April were considerably higher in Portsmouth Harbour than the first three tides after the new moon on the 24th of March; yet the new moon in March was nearer to the earth's equator than the new moon in April, and of course her attraction of the water was greater than in the former month: the sun in March was also nearer the earth than he was in April, and his attraction proportionably greater. The moon's horizontal parallaxes in the Nautical Almanac at the time of these new moons, are the same within *one second*, and the greatest for the year till the last day of October; yet the difference in the height of the spring tides at these times was fifteen inches greater immediately after the last new moon. It would be difficult under these nearly coinciding circumstances to account for this unusual swell of the tides, without referring to, and taking into consideration the state of the weather, and the position and strength of the wind which influenced it. In March only three-fifths of rain fell here; and the evaporation was nearly as great as that of the present month, and the weather remarkably calm. In April between three and four

inches fell, and a SW. gale from over the Atlantic blew strong two days before and two days after the last new moon, which in connection with this depth of rain, must have caused the swell and comparative difference in the last spring tides on our shores. A remarkably low ebbing of the tide, six feet lower than is usual at the same age of the moon, occurred here the third day after the new moon in March.—*Ibid.*

On the Formation of Formic Acid.—M. C. G. Gmelin has prepared formic acid from cane sugar, sugar of milk, starch, wood, the root of the *althæa*, mucic acid, &c. by distilling those bodies with dilute sulphuric acid and peroxide of manganese; but the formic acid thus obtained is always impure. He has, however, obtained it in a high state of purity, by distilling alcohol with sulphuric acid and oxide of manganese. But to prevent the formation of ether, dilute alcohol must always be employed; common spirits of wine is the most convenient. Concentrated alcohol produces not only sulphuric ether, but also formic ether.

M. Gmelin has not been able to prepare formic acid by the use of acetic acid. The fibrin of the blood furnishes a very impure formic acid.—*Annalen der Physik. und Chemie.* xvi. 55.

On Artificial Crystals of Oxide of Iron.—M. Mitscherlich has examined crystals of oxide of iron, found in a pottery furnace at Oranienbourg. They were in very obtuse rhomboids, and resembled the specular iron of volcanoes, having the same brilliancy, hardness, streak, and other properties. The smaller crystals, composing extremely thin plates, were transparent and red, like micaceous iron. The faces were brilliant, the angles could be measured, and were the same with those of the natural crystal. So greatly do these resemble the crystals from volcanoes, that the same theory of formation may be applied to both. The first are formed in a pottery furnace, in which the vessels, when baked, are glazed by means of common salt. The clay used consists principally of silica, alumina, and a little oxide of iron. The salt is volatilized, and water coming in contact with the surface of the vessels, new compounds are produced, the water is decomposed, muriatic acid is formed, and the soda produced unites with the silica to make the necessary glass. As to the oxide of iron, its history will be best understood by an experiment or two. If a mixture of salt, oxide of iron, and silica, be heated to redness in a tube, and water in vapour be passed over it, much muriatic acid is formed, but very little chloride of iron, and crystallized oxide of iron will be found in the mass: but if muriatic acid be brought in contact with ignited oxide of iron, water and chloride of iron are formed, and sublime; if the chloride of iron come in contact with more water, muriatic acid is first developed, then chloride of iron, and a residue of crystallized oxide of iron remains. The formation of chloride of iron by the action of muriatic acid upon oxide of iron appears, therefore, to depend upon the proportion of water present. M. Mitscherlich applies these experiments and principles in explanation of the manner in which volcanic crystallized oxide of iron is formed—all the conditions necessary, according to the above view, being present in those cases, where heretofore it had been supposed the oxide of iron, as such, had been actually sublimed.—*Bull. Univ.* B. xix. 245.

Account of a curious phenomenon of revolving motions, produced by the combination of Alcohol with Laurel Oil. By Dr. Hancock.—To exhibit a singular spectacle which seems to bear some analogy with the motions of the planetary orbs, take a vial of laurel oil and drop into it, at different intervals, some rectified spirits of wine, when the most interesting results will be observed to ensue; a circulation presently commencing, of globules of alcohol up and down through the oil, which will last for many hours, or for days, (how long is un-

known.) A revolving or circulating motion also appears in the oil, carrying the alcoholic globules through a series of mutual attractions and repulsions,—the round bodies moving freely through the fluid, turning short in a small eccentric curve at each extremity of their course, passing each other rapidly without touching; but after a time, they seem to acquire a density approximating to that of the lower stratum, which appears to be an aqueous portion, separated by the ethereal oil from the alcohol; and this assimilation taking place, the globules, after performing many revolutions, will fall flat upon the surface, and unite with the lower or watery stratum.

The orbits of those small globules being confined by the glass are very eccentric. In the course of the experiment, I observed particles of the fluid to separate in larger globular portions; these commenced a similar revolution, and smaller ones quitted their course and revolved about the larger, whilst the latter still pursued their course after the manner of primary planets and their secondaries. This, however, can only be well understood by seeing the experiment, which is easily performed, and well worth the trouble; as it appears to me, that, if attentively studied, it might furnish important deductions, and serve, we know not how far, towards an illustration of the celestial motions.

In the present case, the revolving motion of these globules appeared to be, not, as we are accustomed to regard the planetary motions, as the effect of a direct attractive and repulsive power, in combination with a projectile force, but as revolving in a circulating medium, attended by an emanation from the globules themselves.

This experiment was performed with a small vial. Perhaps a larger one would render the result more perspicuous.—*Brewster's Journal. No.* V. p. 51.

Power of metallic rods or wires to decompose water after their connection with the galvanic pile is broken.—In the experiments which I undertook in 1806-7, in company with Mr. Hisinger, we had found that rods of metal which were employed to decompose water by means of the galvanic pile continued to develope gas after their connection with the pile had ceased,—a circumstance which seemed to indicate a continuance of electrical state, though these rods showed no action upon any other portion of liquid, even of the same kind, than that in which they had been placed during their contact with the pile. This observation, which I had almost forgotten, has been lately confirmed by Pfaff, who has also added to it several others of a similar kind. We might suppose such effects to be produced by a residual polarity, both in the liquid and the metal, showing itself, as long as it continued, by a continuance of chemical action; but some of Pfaff's experiments seem to oppose this idea, for he found that the addition of ammonia to the liquid, by which all its internal polarity was destroyed, did not deprive the wires of their effect. The metals which acquire this property in the highest degree are zinc and iron, next to which is gold. He attempts to explain the phenomenon, by supposing that the continued passage of the electrical stream had brought the elements of the water nearer to a state of separation, so that a very slight influence was sufficient to destroy their union. It must be confessed, however, that we cannot at present advance a satisfactory explanation.—Berzelius, *Arsberättelse*, 1829, p. 33.—*Ibid.*

Detection of alloy in silver by the magnetic needle.—Oersted has made an ingenious and novel application of the magnetic multiplier. He finds that if a good electro-magnetic multiplier, with double needles, be suspended by a hair or a thread of unspun silk between two pieces of wrought silver, differing only one per cent. in the quantity of copper they contain, so sensible an effect is produced upon the needle as to render this a more accurate method of proof than the common touch-stones. Small trial plates are made of different degrees of purity, and the piece to be tried is compared with them in the following way: A thin piece of woollen cloth is dipped in muriatic acid, and laid upon the trial plate, after

which the piece to be tried is brought into contact with the acid and the wire of the multiplier. The deviation of the needle shows which contains the most alloy, and another trial plate must be employed till the needle cease to be affected, when both are of equal fineness. In coming to a conclusion on this point, however, several circumstances are to be taken into consideration. Wrought silver goods are generally deprived of a portion of their copper by the action of acids, so as to render the surface finer than the inner part of the metal; the proof plates, therefore, must be prepared in the same way. Another source of error in the indications of the needle, are the unequal polish and size of the two pieces of metal; the latter of these is especially difficult to overcome when the surface of the metal to be proved is not plain. When, instead of muriatic acid, a dilute solution of caustic potash is employed, and the result is unlike, it is shown that copper is not the only alloy, but that brass is present; and the potash solution renders that which contains brass so positive, that it seems considerably purer than the trial plate. This is the case also in a very high degree when the alloyed metal contains arsenic, for example when what is called white metal has been used for an alloy. This mode of proof is exceedingly interesting in a scientific point of view, and cases may occur in which it can be employed with advantage; but the sources of error can scarcely be ever so completely done away with as to make it a practical instrument in the hands of the silversmith, as Oersted seems to expect.—*Ib.*

Iron Pyrites.—It is known to mineralogists that common or octohædral pyrites and the white pyrites, which from their difference of form were considered by Haüy as different species, were found by Berzelius to be identical in composition, or at least that no such difference existed as to warrant their being considered as different species. The explanation then given by Berzelius has been confirmed by later experiments, and he has published the following additional remarks: "When a portion of common pyrites was permitted to fall asunder, I found it to be caused by the formation of a small quantity of protosulphate of iron, which burst asunder the crystallized mass. When the salt was dissolved in water no trace of free sulphur was obtained, from which it appeared, that the efflorescing pyrites contains particles of F *e* S (sulphuret of iron,) which, changing to the state of salt, tears asunder the rest which undergoes no change. When the small quantity thus changed into sulphate of iron is compared with that which remains unaltered, I did not think that the results of analysis could be obtained to such a degree of accuracy as to determine the matter with certainty. I have since obtained a satisfactory proof of the accuracy of this explanation. I heated carbonate of iron gently in a stream of sulphuretted-hydrogen. There were formed first *sulphuret*, and afterwards *bisulphuret* of iron. The experiment being stopped before all the iron was changed into bisulphuret, a pyrite was obtained, which in a few days fell asunder in all directions, and changed into a woolly mass of vitriol of ten times its former volume. Sesqui-sulphuret of iron prepared from the oxide has not this property. It seems, therefore, highly probable, that the falling asunder of the common pyrites arises from the electro-chemical action of the electro-negative bisulphuret upon the sulphuret which is here and there mixed with it in small particles.—*Ibid.*

Buccina,—a new principle in Box-wood.—An apothecary of Bordeaux announced to the Pharmaceutical Society of Paris, at its last sitting, that he had discovered in the wood, and particularly in the bark, of the box-tree, an alkaline principle, to which he gives the name of buccina. It is in the form of powder, and neutralizes acids, forming uncrystallizable salts: it has a very strong sudorific action and bitter taste. M. Dupetit Thouars, in making this statement at the Philomathic Society, remarked that buccina might perhaps be advantageously used in the manufacture of beer, "for there is more box-wood than hops employed in making almost all the beer brewed in Paris."—*N. M. Mag.* xxx. 112.

CATALOGUE RAISONNÉ.

Reflections on the Decline of Science in England, and on some of its Causes. By CHARLES BABBAGE, Esq. Lucasian Professor of Mathematics in the University of Cambridge, &c. Pp. 228. FELLOWES, London 1830.

We have been prevented, by the press of matter in the department of "Reviews," from publishing in the present No. our opinion of this important volume. We can only say on this occasion, that as the application of any power is, *cæt. par.*, as valuable as the invention of any other, this work is calculated to give an impulse to science in this country, by no means weaker than that which came from the hands of the immortal Bacon. Mr. Babbage deserves well of his fellow-labourers for stepping down from his chair to expose the practices of those from whom other things might have been expected. He has conferred a benefit on England which can never be forgotten, and which he was admirably fitted to perform. The periodicals of London seem desirous of passing the book over in silence: not so the freemen of the north. Dr. Brewster has thought it worth while to print 35 pages *verbatim* from this work in the No. of his Journal for the present month, (why did he omit the note which bears such high testimony to the character of Dalton?) and to us it will become a text-book.

It will be seen even from our present No. that we have been some time yoked to the same drudgery as Mr. Babbage has undertaken; and we now rejoice in such a coadjutor. In the mean time, let every one who is desirous of perusing one of the most gentlemanly but complete exposures of nefarious doings and lamentable incapacity amongst men of scientific repute, which perhaps was ever penned, immediately buy the book; and let every one who would support the character and reputation of his country, buy the book.

An Outline of the First Principles of Botany. By JOHN LINDLEY, F.R.S. L.S. & G. S. &c. Professor of Botany in the University of London. LONGMAN & Co. London, 1830.

In this excellent little work, the principles of botany are compressed into 106 24mo. pages. The matter is arranged under the following divisions: Elementary Organs, Compound Organs, Root, Stem, Leaf-buds, Leaves, Hairs, Food and Secretions, Flower-buds, Inflorescence, Floral Envelopes,—Male Organs, Stamen, Disk,—Female Organs, Pistillum, Ovulum,—Fruit, Seed, Flowerless Plants. The whole is disposed in the form of numbered paragraphs, a plan which affords the greatest possible facility of reference from one part of the work to another. The reader will be able to form some idea of the manner in which Professor Lindley has executed his work, by the following specimen:

227. The Flower-bud (143) consists of imbricated, rudimentary, or metamorphosed leaves, the external or inferior of which are usually alternate, and the internal or superior always verticillate, or opposite; the latter are called *floral envelopes* and *sexes*.

228. As every flower-bud proceeds from the axilla of a leaf, either fully developed or rudimentary, it therefore occupies exactly the same position with respect to the leaf as a leaf-bud.

229. The leaf from the axilla, of which a flower-bud arises, is called a *bractea*, or *floral leaf*; and all rudimentary leaves, of what size or colour soever, which appear on the peduncle between the floral leaf and the calyx, are called *bracteolæ*.

230. But in common language, botanists constantly confound these two kinds, which are, nevertheless, essentially distinct.

This little book is in reality the only philosophical and precise original introduction to botany in the English language; but it is, after all, only an outline, and we trust the author will lose no time in filling it up, and giving it that air of importance, in the eye of the public, which it justly merits.

Letter relating to the Figure of the Earth. By James Ivory, Esq. M.A. F.R.S. &c.—*Phil. Mag. April* 1830.

Mr. Ivory writes this letter as a statement of what he has contributed to the theory of the figure of the earth, and to assert his claim to his peculiar notions.

He considers himself to have demonstrated the insufficiency of Clairault's theory, by showing that it inadvertently neglects the attraction between certain portions of an homogeneous planet, supposed fluid: and by this means omits to take into account pressures prevailing in the interior of the mass, and vanishing at the surface, which cannot but have an influence on the figure of equilibrium; and further states, that he gave the true conditions for the equilibrium of a homogeneous planet in a fluid state, deduced *a priori* from the principle of hydrostatics, without neglecting any cause tending to change the figure of the fluid, in the Phil. Trans. for 1824.

It is now well known that the equation given by Maclaurin, of the surface of a spheroid, (supposing that a fluid homogeneous planet is in equilibrium when it has the figure of an oblate elliptical spheroid of revolution,) has two different solutions. To account for the existence of two figures of equilibrium which would result from this equation, Mr. Ivory examined the forces in action in the interior of the mass, and found that two different sets of surfaces may be traced within the fluid, each of which is possessed of the property of the level surfaces in Clairault's theory, that is, the intensity of pressure is the same at all these points. The two sets of interior surfaces have different relations to the outer surface, and one set only can properly be called level surfaces.

Lastly, Clairault resolved the problem a long time ago with respect to the equilibrium as applied to a heterogeneous fluid, but retained only the first power of the ellipticity. Mr. Ivory states himself to have published, in the Phil. Mag. for July 1826, a solution which takes in the second power of the oblateness, by a method which may be extended to any power of the same.

Linnæa, a Botanical Journal. By Dr. D. F. L. Schlechtendal, July and October 1829. 8vo. Berlin.

These two numbers contain, amongst other papers; 1st, the continuation of the description and classification of the *Synantheræ* of the Herbarium of Berlin, by F. Lessing; 2. a review of the *Hepaticæ* of the Cape, by Lehmann; 3. remarks on the *Cratægus* and *Rumcx* of the flora of Germany, by Fingerhuth; 4. descriptions of new or rare cryptogamous plants, (*Cæoma*, *Uredo*,) by Fr. Rudolphi; 5. new genera of phanerogamous plants, by Hemprich and Ehrenberg; 6. varieties or hybrids of indigenous plants, by Lasch; 7. an enumeration of mushrooms (*Hymenomyceti pileati*) recently found in the march of Brandenburg, by Leasch; 8. a general view of the flora of Mexico, by M. Schiede.

Zeitschrift fur Physiologie, Gazette of Physiology. By Tiedemann and Treviranus. Vol. III. Part 2. 1829.

This Part contains, amongst other memoirs; 1. anatomy of the *Aphrodita aculeata*, Lin. by G. R. Tréviranus; 2. on the fractures of bones, and the sutures which they form, by S. Th. de Sœmmering; 3. on the formation of neuters in the *Hymenoptera*, and principally in bees, by G. R.

Tréviranus; 4. description of the brain, and of the spinal marrow of a monster by excess, by Tiedemann; 5. description of three bi-corporate monsters, by Mayer of Bonn; 6. new observations on the posterior extremities of the serpent, and on the scales of the *Cæcilia*, by Mayer; 7. are light and heat developed during the life of plants? by L. C. Tréviranus; 8. action of musk on plants, by Goeppert; 9. analysis of the milk of women, by Meggenhofen.

The Edinburgh Journal of Science; conducted by DAVID BREWSTER, LL.D. &c. No. V.—N. S. July 1830.

The original papers in this number are, 1. Account of steam-engines in Cornwall, by W. J. Henwood; 2. Experiments on laurel oil; and account of a curious phenomenon of revolving motions, produced by the combination of alcohol with laurel oil, (Vide p. 302. *supra*,) by Dr. Hancock; 3. Description of a new rain-gage, by M. Adam; 4. On fossil remains in the Velay, (Vide p. 308. *infra*,) by Dr. Hancock; 5. On the double chlorides of gold; by J. F. W. Johnston; 6. Observations on some passages of Dr. Lardner's treatise on mechanics, by the Rev. W. Whewell; 7. Meteorological observations made at Kendal, by Mr. S. Marshall; 8. Register of the barometer, thermometer, and rain-gage, at Canaan Cottage, near Edinburgh, by A. Adie, Esq.

Structure et Formation, &c. Structure and Formation of the Operculum in Gasteropodous Pectinibranchial Mollusca. By M. ANT. DUGES.—*Ann. des Sci. Nat.* Oct. 1829.

The author divides these opercula into three classes, the *cochleiform*, *valviform*, and *patelliform*. The first (the *spiral* of De Blainville) belong to to the *Naticæ*; the second (the *toothed* and *laminated* of Bl.) are found in certain *Murices*, *Fusus*, *Buccinum undatum*, &c.; the third (*concentric* or *scaly* of Bl.) belong to the *Paludinæ*.

According to M. Dugès, it is always the collar and not the foot, as has been stated by some writers, which forms and nourishes the operculum; it is sometimes the whole circumference of the collar, but more frequently its posterior part, which is the organ of production. The columellar border, and posterior extremity of the operculum, are consequently the parts where the increase takes place; the oldest portions are driven outwards and forwards, whence result the spiral convolutions of some, and the scaly disposition of others.

Synopsis of the Organic Remains of the Ferruginous Sand Formation of the United States, with Geological Remarks. By SAMUEL G. MORTON, M.D. of Philadelphia.—*American Journal of Science and Arts.* No. II. Vol. XVII.

By most of the geologists of continental Europe, the ferruginous sand, including iron sand, weald clay, green sand, and chalk marl, is considered as a lower division of the chalk, while in this country it is more generally supposed to be a link in a distinct formation, intermediate between the chalk and the oolites. This formation occupies, in North America, a great part of the triangular peninsula of New Jersey, formed by the Atlantic, and the Delaware and Raritan rivers, and extends across the state of Delaware, from the city of that name to the Chesapeake: appears again near Annapolis in Maryland, at Lynch's Creek in South Carolina, at Cockspur Island in Georgia, and at several places in Alabama, Florida, &c. The mineralogical characters, and the mineral contents of the American beds, do not appear to present any remarkable differences from similar formations in other countries. Many new shells are, however, enumerated as characteristic; among which are six chambered

univalves, (there are no well determined species of simple or spiral univalves.) The species of bivalves belong chiefly to the genera Tarantula, Gryphæa, Astræa, and Exogyra of Say, but they are not very numerous. Some well determined genera of Echinideæ, Crustacea, and Zoophytes, are also mentioned.

Inquiry into the circumstances under which the Remains of some Fossil Animals were accumulated in the volcanic soil of the Velay, in France. By S. Hibbert, M.D. F.R.S.E. &c.—*Ed. Journ. of Science,* No. V.

The lowest rocks of the Velay are crystalline, and are surmounted by sedimentary deposits, probably of quadersandstein. This district was subsequently the seat of a series of lakes, which deposited formations of sandy clays, potter's clay, marly and gypseous beds, &c. characterized by the mollusca and mammifera of the tertiary formations. These are succeeded by a deposit of brown coal, consisting, according to Dr. Hibbert, of birch, willow, alder, &c. with fresh water fish, frogs, lizards, and numerous insects. This brown coal alternates with vegetable and earthy matter. It is covered (at Roche Lambert) by white micaceous sand and clay, with fragments of quartz and feldspar, or by quartzose sand, (at Aubepin,) with hydrate of iron. It appears that the forests *not* covered with these sands, are those which contain the bones of various species of Cervi, of the Rhinoceros leptorhinus of Italy, and the Hyæna spelæa. Volcanic eruptions broke forth at this period, marked by trachytes and basalt; and torrents of lava, ejections of scoriæ, and deposits of tufa, spread themselves over the country. The brown coal, (at Collet, Ronzal, &c.) alternates with trachytes, phonolites, basalts, and volcanic cinders. Dr. Hibbert accounts for some of these alternations, by supposing the Loire to be dammed up at the gorge of Chamelieres by dikes of lava, and to have formed two lakes, in which these deposits were formed, and he has ingeniously applied the same theory to account for many other interesting facts connected with the volcanic and transpoted soil of the Velay.

Notice of a Submarine Forest in Largo Bay, in the Frith of Forth. By the Rev. Dr. Fleming of Flisk.—*Brande's Journ. March* 1830.

The rocks on which this forest rest, belong to the medial order, and are accompanied by traps. The soft bed on which it is immediately incumbent, consists of brown laminated clay, which may be referred to lacustrine silt. Sands and fine gravel cover the deposit, also of fresh water origin; and over them is a bed of peat, composed of the remains of land and fresh water origin. The trees interspersed are generally birch, hazel, and alder. The nuts of the hazel were likewise observable. The clay is now burrowed by the Pholas candida, and the peat contains a Spio, named by the author *S. emarginatus.* The author connects the phenomena presented by these quaternary formations, with the supposition that the space now occupied by the German Ocean was formerly a fresh water lake.

Sur une nouvelle, &c. On a New Species of Fossil Bear, *Ursus Pitorii.* By Marcel de Serres, in a Letter to Baron de Ferussac.—*Bull. de Sci. Nat. Jan.* 1830.

The bones of this bear were found, with the remains of other carnivora, in the caves of Fauzan, by Mr. Pitorre, and have belonged to a larger animal than the Ursus spelæus, in whose company Marcel de Serres thinks that it occurs in the caverns of Sundavig in Prussia. The author has not been enabled to examine the bones of the head; but the lower maxillary and the teeth furnished marked differences from the U. spelæus, and approximated to existing species. It has been found, like the U. spelæus, in deposits which also contained remnants of pottery.

PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

EDINBURGH.

The Royal, the Wernerian, and the Royal Physical Societies, have terminated their Sessions.

Society of Arts for Scotland.—The following communications have been read and exhibited to the Society since 17th February 1830:

3d March 1830. 1st, a model and description of a cart to be propelled by levers and cranks, acted on by the weight and force of one man, without a horse. By William Allan, Morningside.

2d, Description of a slow motion for the beam compass. By Mr. Edward Sang, teacher of mathematics, Edinburgh, M.S. Arts.

17th March. 1st, An account of the latest improvements in the turning lathe, including the slide-rest, and apparatus for drill-turning; as also an account of the planing-engine and apparatus, with engravings. Communicated by John Robison, Esq. Sec. R.S.E. and M. S. Arts.

2d, Drawing and description (as amended) of a simple, cheap, and accurate rain gage. By Matthew Adam, A.M. rector of the academy of Inverness, and Assoc. S. Arts.

3d, Description of a pendulum chronometer, in which the arbors of the wheels move on friction rollers, and the pinion leaves are made so as to revolve by the impulse of the wheel teeth, which are of a peculiar form. Made by David Whitelaw, watch and clock maker, 16, Prince's Street, Edinburgh, for the late Andrew Waddell, Esq. Hermitage Hill, Leith. Communicated by Mr. Waddell.

31st March. 1st, Observations on the application of heated air to the warming of dwelling-houses, and of churches, hospitals, and other public buildings; with remarks on various kinds of stoves used for this purpose. By Mr. Robert Ritchie, ironmonger to his Majesty, High Street, Edinburgh. Models of the stoves, &c. were exhibited.

2d, Description of an improved levelling rod. By Mr. James Flint, civil engineer, Terrace, Edinburgh. The rod was exhibited.

3d, Additional observations on safety windows for upper stories of houses. By Thomas Johnston, ink-manufacturer, Glasgow.

14th April. 1st, Remarks on the eidograph, pentagraph, &c. were read; by Mr. Professor Wallace, F.R.S.E. and Memb. S. Arts. The instruments were exhibited.

2d, Notices of various plans of applying heat, either by common fire-places, or by steam apparatus, were communicated. By Mr. Robert Ritchie, ironmonger to his Majesty, High Street, Edinburgh. Models of various stoves, &c. and of a drying-house, were exhibited.

3d, Notice of an apparatus for facilitating the making of infusions by hot water, and particularly from coffee. By John Robison, Esq. Sec. R. S. E. and M. S. Arts.

28th April. 1st, Notice respecting Mr. Cuthbert's elliptic metals for reflecting microscopes. Communicated by Dr. Brewster, F.R.S.E. and M.S. Arts.

2d, Investigation of the spherical aberration of a diamond lens. By Mr. Andrew Pritchard, London, Hon. Memb. S. Arts for Scotland. Communicated by Dr. Brewster, F.R.S.E. and M.S. Arts.

3d, Description of the improvements of the common mortice lock. By Mr. James Williamson, Melrose, Assoc. Soc. Arts. The lock was exhibited.

4th, Description of a method of destroying vermin on fruit trees, bugs, &c. by means of steam. By James Grieve, coppersmith and brazier, 20, Greenside Place, Edinburgh. The apparatus was exhibited.

5th, Notice regarding the improved steam indicator and old test. By John M'Naught, engineer, Glasgow.

6th, Memorial on the construction of chimnies, so as to prevent smoke. By Alexander Mollison, Eglinton Street, Glasgow.

7th, Notice of a Swiss lock, of a neat, simple, and efficient construction, made by Mr. Cormack, smith, Chalmers' Close, for, and presented to the Society by Sir Alexander Muir Mackenzie of Delvin, Bart. The lock was exhibited.

LONDON.

Royal Society.—April 29. A paper by J. W. Lubbock, was read on the Variations of the Elliptic Constants, and several works were presented.

May 6. A paper on the occurrence of Iodine and Brome in mineral springs, by Dr. Daubeny, Professor of Chemistry in Oxford, was read.

May 13. A paper was read, entitled, An Essay on the Preserved Bodies of Aboriginal Peruvian Indians, by W. T. Carter, M.D., Surgeon R.N.

May 27. The president informed the meeting that he had written to Mr. Babbage, requesting him to attend on this evening, in pursuance of a resolution adopted on Thursday se'nnight. Mr. Babbage, in answer to the president, states his unwillingness to become a party to such discussions as took place on the occasion alluded to: adding his opinion, that the meetings of the Society ought to be, as they were intended, devoted to philosophical enquiry, and not to angry debate. In this view the president concurred; and having recited one of the by-laws in support of it, he said that he trusted the matter would be allowed to rest.* Dr. Roget then read a paper, by Mr Costello, on the instruments used in operations of lithotrity, illustrated by cases.

Linnæan Society.—May 4. There was read an examination of M. Virey's observations on aëronautic spiders, published in the *Bull. des Sci. Nat.*

May 22. The anniversary meeting of this society took place this day, Lord Stanley in the chair. As is the customary practice, Mr Bicheno communicated to the meeting the accession of fellows which had taken place during the past season; likewise the deaths which had occurred during the same period; amongst these we observed the names of Dr Hamilton, Major-General David Stewart, the venerable Chevalier de Lamarck, professor of zoology in the Jardin du Roi, Professor Brotero of Coimbra; Dr Tozzetti of Florence; Dr Schaub of Cassel, and several others. Twenty-one fellows had been elected during the year. Mr Forster stated that the amount of subscription for the library, herbaria, &c. of Sir J. E. Smith, once belonging to Linnæus himself, and now purchased by the Society, amounted to upwards of L.1400; that the Society's other receipts for the year amounted to L.1600, which exceeded the outlay by L.200. Several gentlemen set the example of an annual subscription in aid of the balance due to the executors of Sir J. E. Smith. Earl Brownlow, Professor Buckland, George Bentham, Charles Stokes, and William Yarrell, Esqs., were elected into the council. The other officers stand as heretofore.

Geological Society—March 19. Extracts were read from a paper entitled "Reference to a Geological Map and Section of Pembrokeshire," by Alfred Thomas, Esq.

The first of two letters addressed to R. I. Murchison, Esq. Sec. "On the Lacustrine Basins of Baza and Alhama in the province of Granada, and similar deposits in other parts of Spain," by Colonel Charles Silvertop, F.G.S., was then read.

* Dr. Roget published an answer to certain of Mr. Babbage's charges, in the last number of the Ann. of Phil., but Mr. Babbage has since reiterated his accusations.—Ed.

April 2. A paper on the Geology of Weymouth, and the adjacent parts of the coast of Dorsetshire, by the Rev. Dr. Buckland, and Henry Thomas de la Beche, was read.

April 16, The reading of the paper on the Geology of Weymouth, and the adjaccnt parts of the coast of Dorsetshire, was concluded.

A paper entitled " Description of a New Species of Ichthyosaurus," by Daniel Sharpe, Esq. F.G.S., was then rcad.

PROVINCIAL.

Newcastle Natural History Society.—At the monthly meeting of the Newcastle Natural History Society, on 18th May, the Vicar of Newcastle in the chair, it was resolved that the Anniversary Meeting shall be held on the first Tuesday in August, and not in June, as before intended. By this re-arrangement it was hoped more country members would be able to attend ; and the Transactions of the Society, now printing, bc more complete. The receipt of presents was then acknowledged. Several Engravings to illustrate Mr Selby's paper on thc new Swan (Cygnus Bewickii) having been prcsented by that gentleman to the society, prints of them were laid on the table ; for them, and his valuable present of bird-skins, the thanks of the meeting were unanimously voted to him. An account of the situation of several Hazel Nuts found in an old mine near Alston, while driving a drift for lead ore, was communicated by Mr Pattinson, of that town ; they were diffused through a mass of gravel, in the limestone strata, of about a cubic foot thick. Some observations, by Mr Francis Forster, on the geology of Racheuch Crag, were theu read ; they went to prove, from the various particulars of the basalt, &c. in the neighbourhood of each, that the crag was a continuation of the Dunstanborough range. Mr Hutton read a postscript to his paper on the new Red Sandstone of the county of Durham, below the Magnesian Limestone.

FOREIGN.

Acts of the Geographical Society of Paris.—Sitting of 4th Dec. 1829.—M. Yosy, on the point of undertaking a journey in America, expressed a desire that the Society would provide him with instruments, as had been done in the case of other travellers. A Bunten's barometer was accorded to him.

M. Jomard communicated a letter from M. C. Moreau, relative to a *fac simile* of a map in the British Museum, executed in the 10th century, and explained by Mr Playfair.

M. de Vins de Pcysac addrcssed to the Society a census of the population of the Havannah in 1828, by Don Manuel Pastor.

M. Warden communicated a statistical table of the population and rcvenue of the province of Ccrcada (Department of Lima.) The same author suggested that the commission should decide on several MS. maps of the coasts of Peru, submitted to the Society by Captain Skiddy.

M. Jomard exhibitcd specimens of the work of the young Ethiopians educated under his direction.

Sitting of the 18th Dec.—M. Raboteau, Professor of Geography, wrotc to the Society to call its attention to Georama, which was threatened to be destroycd. Several members wcre authorized to visit the establishment and report.

Dr Reinganum of Berlin transmitted two manuscript noticcs by Mr Buschmann, entitlcd Description of Vcra Cruz, and Indcx Geographicus Regnorum Mexici et Guatemalæ, &c.

M. Yosy prescnted a Mcmoir by M. Auber, on the Gcology of the Island of Tenerifffe, &c.

Captain D'Urville depositcd at the board a map of the Bay of Tasman, laid down during the cxpedition of thc Astrolabe.

Academy of Sciences.—Meeting of 15th February, 1830.—The Baron Roussin was elected to the place vacant by the decease of Mr. de Rossel.

Mr. Latreille was elected Professor of Entomology to the Museum of Natural History.

Mr. Navier read a letter from Colonel Raucourt, "On the temperature of the Neva, and on the formation of ice at the bottom of that river."

Messrs. Robiquet and Boutron-Charlat informed the Society that they had obtained Benzoic acid, in a neutral state, from the oil of bitter almonds.

Messrs. Puissant, Dupin, Damoiseau, and de Prony reported favourably on the globes and planispheres of M. Miller.

Messrs. Desfontaines and Mirbel reported favourably on a memoir on the Capparideæ, by Mr. Cambessides.

Mr. Geoffroy St. Hilaire reported also favourably on a memoir on the organization of the Crustaceæ, by Messrs. Laurencey and Meyraux.

Mr. Navier reported very favourably on a work of Mr. Beaudemoulin on Hydraulics.

Meeting of 22d February.—Baron Cuvier read a memoir, being considerations on the Mollusca, and on the Cephalopoda in particular.

Mr. Mirbel reported favourably on a memoir on the families of plants, with parietal placentas.

Meeting of 1st March.—Mr. Geoffroy St. Hilaire read a memoir on the character of the doctrine of uniformity of organization, called Theory of Analogies.

Mr. Dalton was elected to the place vacant by the decease of Sir Humphrey Davy.

Meeting of 8th March.—Mr. Auguste St. Hilaire was elected to the place vacant by the decease of Mr. Lamarck.

Mr. Puissant read a memoir, being a new application of the calculation of probabilities.

Mr. Becquerel communicated the discovery of sulphuret of lime in a bed of argillaceous marl, accompanying the gypsum formation of Montmartre.

Messrs. Freycinet and Beautempre de Beaupré reported favourably on Captain Dillon's work.

Mr. Serullas read a memoir on the mutual action of iodic acid and morphine, or of the acetate of that base.

Meeting of 16th March.—Mr. Chevreul announced the reception of a letter from Berzelius, in which he communicated the discovery of butyric acid in human urine.

Mr. Serullas read some observations on the chloruret of iodine.

Mr. Roussin reported favourably on Mr. Beltrami's work on Mexico.

Mr. Girou de Buzareignes read, in the name of his father, some experiments on the generation of plants.

Mr. Gerdy read a memoir on the mechanism of the motion of the limbs and of the body in the act of leaping.

Mr. Milne Edwards addressed a memoir on a particular disposition of the branchial apparatus in some crustacea.

Meeting of 22d March.—Baron Cuvier read a memoir entitled considerations on the hyoid bone.

Mr. Geoffroy St. Hilaire read a memoir, entitled "On the application of the theory of analogies to the organization of fish."

Meeting of 29th March.—Mr. Boubée read a memoir, being general considerations on the animals that lived at the different geological epochs.

Mr. Soubeiran read a memoir on the arseniurets of hydrogen.

Mr. Geoffroy St. Hilaire read a memoir on the hyoid bone.

MISCELLANEOUS INTELLIGENCE.

University of Edinburgh.—Dr. Christison, in his lectures on Medical Jurisprudence, has adopted the only system of education which can reward the labour of the teacher by the proficiency of the pupil. He gives regular examinations on the subjects upon which he has lectured, and stimulates emulation amongst his students, by giving cases or theses as a constant exercise. Dr. C. promises, on many accounts, to sustain and add to the reputation of the University.

Dr. Graham, on a recent occasion, during his lectures on Botany, pronounced a well-merited eulogium on the East India Company for their princely liberality in the promotion of botanical science. We find that their garden at Calcutta occupies a surface of several hundred acres, and there are more than 300 labourers employed in it. A number of collectors, paid by the company, are constantly travelling over the countries subjected to its dominion, and continually enriching the garden and collection. This collection is immense, and has been the source of numerous discoveries. Dr. Roxburgh, at a former period, gave a glimpse of the treasures it contains; and Dr. Wallich is now opening them to view. But besides the great labours of Roxburgh and Wallich, there are others which have been protected or encouraged by the Company. Messrs. Kœnig, Heyne, Carey, Patrick Russel, Röttler, Klein, Wight, Finlayson, &c. have traversed various parts of India, with the view of studying its vegetation. All the collections of dried plants which had been made by these travellers for nearly fifty years past, were sent to London, and presented to the Company's museum. The immensity of these materials made the directors feel that it was impossible to render them useful without the co-operation of a great number of observers. By an order remarkable for its liberality, the Court of Directors has instructed Dr. Wallich, who is now for a time in London, to distribute these valuable collections as presents to the principal botanists of Europe, taking proper measures to secure the publication of them. This liberal distribution has already commenced, and it is probable, that from this act of generosity of the Company, we shall see within a few years the whole of the plants collected in the East Indies increasing the mass of known vegetables. The number of them is estimated to be at least from 7000 to 8000 species, and every one may easily conceive how many facts, ideas, and new analogies will result from this increased addition to our present botany. "The East India Company," says M. De Candolle, "has thus acquired the most honourable title to the gratitude of the savans of all countries; and we are very sure that every friend of science will applaud this great act of liberality, and join with us in expressing his gratitude."

Meeting of Scottish Naturalists.—We are gratified in being able to inform our readers, that the proposal we mentioned in our last number is to be carried out. A private meeting of the naturalists of this neighbourhood will this summer be held over the festive board, and arrangements will then be made for organizing a general meeting on ensuing years.

Dr. Wallich has been elected a member of the *Academie Royale des Sciences de l'Institut de France.*

The Royal Academy of Sciences at Berlin has elected Messrs. Poisson and Arago corresponding members of the Academy, in the room of Laplace and Volta, deceased.

Necrology.—M. Fourier, Member and Perpetual Secretary of the Academy of Sciences, died on the 19th of May, in his sixtieth year. He was one of the *sa-*

vans who accompanied Buonaparte in his Egyptian expedition, and wrote the preface to the great *Description of Egypt.* His *Theory of Heat* gained him the prize of the Institute, and has since been completed by a Series of Memoirs published successively in the Memoirs of the Academy of Sciences. The last which has been printed contains many new views, the result of experiment, and very important calculations on the temperature of interplanetary space, the decrease of terrestrial heat, &c. He was engaged at the time of his death in preparing for the press a large work in two volumes, entitled *Analysis of Algebraic Equations.* M. Arago has been appointed Perpetual Secretary in his place.

M. Gosselin, the celebrated geographer, died at Paris on the 7th of February last, at the age of 78 years. His principal works are: 1. *Géographie des Grecs analysée, ou les Systèmes d'Eratosthène et de Ptolémée, comparés entre eux, et avec nos connaissances modernes,* 4to., with nine plates, 1790: 2. *Recherches sur la Géographie Systématique et Positive des Anciens,* 4 vols. 4to.; besides a variety of memoirs inserted in the Class of History of the *Mémoires de l'Institut,* and in the *Mémoires de l'Academie des Inscriptions.* He assisted also in the labours of the French translation of Strabo.

Soemmering, the celebrated anatomist, died in March last, at Frankfort, aged seventy-six.

LITERARY NOTICES.

Mr. Witham of Lartington, in a work now in the press, proposes to exhibit microscopic representations of the internal structure of several fossil vegetables, which occur in the coal fields of England and Scotland, and in the Lias formation, accompanied with others of those recent vegetables to which they seem to bear a decided resemblance. By these representations and their descriptions, it is hoped that the existence of dicotyledonous plants in the coal formation, will be satisfactorily proved. Mr. Witham, it is well known, has occupied much of his time in the investigation of organic remains; and this specimen of the results of his labours, cannot fail to be gratifying as well as instructive to geologists. We have seen some of the drawings, and have pleasure in bearing testimony to their great beauty...The Foreign Review is joined to the Foreign Quarterly...A new series of the *Journal des Voyages* has commenced this year; and it is much improved...Dr Graham has published a Synoptical Table of Genera, to be appended to Hooker's British Flora, for the use of students...Mr. Sillery, the poet, announces a philosophical work on the creation, (it is a pity he has chosen such a poetical subject for his *debut* in philosophy.)...M. Geoffroy Saint Hilaire has presented to the Academy, a volume, entitled "Principes de Philosophie Zoologique," in answer to M. Cuvier.

List of New Books.

Babbage on the Decline of Science in England, 8vo., 7s. 6d. bds...Hall's General Atlas, L.8 : 18 : 6...Niebuhr on the Geography of Herodotus, 8vo., 6s. ...Mosely on Hydrostatics and Hydrodynamics, 8vo., 12s...Burckhardt's Notes on the Bedouins, &c. 4to., L.2 : 12 : 6...Domeier's Road-Book of Germany, 18mo., 10s. 6d...Macvicar's Elements of the Economy of Nature, 8vo., 16s... Lardner's Cyclopedia, vol. vii. Cities and Towns...Main's Villa and Cottage Florists' Directory...Stoker's Botanical Commentaries, 8vo...Eschschulz, Dr. F. System der Acalephen. 4to. Berlin. 12s...Reugger, Dr. J. R. Naturgeschichte der Sacuegethiere von Paraguay. 8vo. Basil. 9s.—Withering's Botany, by Macgillivray, 12mo. 10s.

ERRATA.

SINCE this Number has been in the hands of our publisher, we have discovered an error, which we take this, the earliest opportunity of correcting, prior to the publication of our next number.

At page 272, bottom line, in an article on the Wernerian Natural History Society, it is stated that "*Mr. Arnott did not sign*" a letter which is the subject of remark. But we have since ascertained from Mr. Neill, who showed us the letter, that Mr. Arnott's name *is* affixed to it, as well as Mr. Falconar's and Dr. Gillies'. And it is due to Mr. Neill, that we state that he has afforded us every information we requested from him on this subject.

We are concerned that from misinformation this error should have occurred; but it is satisfactory that we are thus able to prevent any erroneous impression being thereby occasioned; and we are the more anxious to take this method of correcting the mistake, as in all other respects the facts contained in the article alluded to appear to be incontrovertible. It will be observed that, even in this case, the correction of the mistake does not alter the conclusions which are drawn from the fact of Dr. Gillies' name being appended to that letter.

Page 307. Line 16. *for* Hancock *read* Hibbert.

(*This slip not to be bound up with the volume, as all the* Errata *will be given in the last No.*)